CITY OF WORCESTER
MASSACHUSETTS

PROJECT MANUAL

WORCESTER PUBLIC SCHOOLS
HANDICAP ACCESSIBILIY UPGRADES

CHALLENGE & REACH ACADEMY
15 Harlow Street, Worcester, MA 01605

GERALD CREAMER SCHOOL
120 Granite Street, Worcester, MA 01604

LINCOLN ELEMENTARY SCHOOL
549 Lincoln Street, Worcester, MA 01605

THORNDYKE ROAD ELEMENTARY SCHOOL
30 Thorndyke Road, Worcester, MA 01606

DIVISIONS 0 THROUGH 33

September 18, 2024

SET NUMBER

SECTION 00 01 10

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END OF SECTION

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CITY OF WORCESTER
INVITATION TO BID / NOTICE TO CONTRACTORS

The City of Worcester, the Awarding Authority, invites sealed bids for: **HANDICAP ACCESSIBILIY UPGRADES FOR CHALLENGE & REACH, GERALD CREAMER, LINCOLN, AND THORNDYKE SCHOOLS** in accordance with documents prepared by Mount Vernon Group Architects, Inc., 264 Exchange Street, Suite G4, Chicopee, MA 01013, for the Worcester Public Schools, DAB, 20 Irving Street, Worcester, MA 01609.

SEALED GENERAL BIDS for **HANDICAP ACCESSIBILIY UPGRADES FOR CHALLENGE & REACH, GERALD CREAMER, LINCOLN, AND THORNDYKE SCHOOLS** will be received at the Department of Public Facilities, 50 Officer Manny Familia Drive, Worcester, MA 01605 no later than 11:00 a.m., Thursday, October 10, 2024, and will be publicly opened thereafter and read aloud.

General Bids must be accompanied by:

(1) A fully executed FORM FOR THE GENERAL BID;
Specification Section 004000.

(2) A fully executed FORM OF SUBCONTRACT;
Specification Section 007000.

(3) City of Worcester form of Tax Payment Certificate;
Specification Section 008500.

(4) **Affidavit of Acknowledgment and Certificate of Compliance** for the City of Worcester Minority/Women Business Enterprise & Worker Utilization. **M/WBEP-Form EOO-101;**
Specification Section 009500.

(5) **Initial Statement and Certification of Compliance** with the Responsible Employer Ordinance**, Form REO-101 page 2.**
Specification Section 009500.

(6) **Provide Evidence** of Compliance with the Responsible Employer Ordinance **(REO)**. As per Specification Section 009500.

(7) **A Certificate of Eligibility** certifying the bidder's qualification in the category of ***General Building Construction*** issued by the Division of Capital Asset Management, DCAM (formerly the Division of Capital Planning and Operations, DCPO), showing that the Bidder has been approved to bid on projects the size and nature of this project. In order to be eligible to be awarded this contract, a general bidder must be certified in the appropriate category and for the total Project Cost including all alternates elected (if applicable) to be taken by the Owner.

(8) **A Contractor Update Statement**, DCPO FORM CQ3. It is the Bidder's responsibility to obtain the necessary forms and make application to DCAM (DCPO) in sufficient time for DCAM (DCPO) to evaluate the application and issue a Certificate of Eligibility. A sample of the **Contractor Update Statement**, DCAM FORM CQ3 (revised December 1999) is located at the end of Section 001500.

(9) Bid deposit for the general bid in the amount of **five (5) percent** of the value of the bid or a bid bond.

(10) **Foreign Corporation Certificate of Registration** from the Commonwealth of Massachusetts State Secretary (if applicable).

(11) **CORI Form**

(12) **Wage Theft Form**

SEALED FILED SUB-BIDS for **HANDICAP ACCESSIBILIY UPGRADES FOR CHALLENGE & REACH ACADEMY, GERALD CREAMER SCHOOL, LINCOLN ELEMENTARY SCHOOL, THORNDYKE ROAD ELEMENTARY SCHOOL** will be received at the Department of Public Facilities, 50 Officer Manny Familia Drive, Worcester, MA 01605 no later than 11:00 a.m., Thursday, October 3, 2024, and will be publicly opened thereafter and read aloud.

Filed Sub-Bids required are as follows:

(1) Section 04 20 00 - Unit Masonry including 04 21 11
(2) Section 05 50 00 – Metal Fabrications including 05 51 00, 05 52 13, and 05 55 16
(3) Section 07 25 00 – Weather Barriers including 07 27 26 and 07 92 00
(4) Section 09 30 00 – Tiling
(5) Section 09 51 13 – Acoustical Panel Ceilings
(6) Section 09 65 16 – Resilient Flooring including 09 65 13
(7) Section 09 91 13 – Painting
(8) Section 14 24 00 – Hydraulic Elevator including 14 24 01
(9) Section 21 00 00 – Fire Suppression
(10) Section 22 00 00 – Plumbing
(11) Section 23 00 00 - Heating, Ventilating and Air Conditioning
(12) Section 26 00 00 – Electrical including 27 05 00, 27 41 00, and 28 10 00

SUB-BIDS must be accompanied by:

(1) A fully executed FORM FOR SUB-BID;
Specification Section 005000.

(2) Certification of Payment of Massachusetts State Taxes Form;
Specification Section 008500.

(3) **Affidavit of Acknowledgment and Certificate of Compliance** for the City of Worcester Minority/Women Business Enterprise & Worker Utilization. **M/WBEP-Form EOO-101; Specification Section 009000.**

(4) **Initial Statement and Certification of Compliance** with the Responsible Employer Ordinance**, Form REO-101 page 2**, **Specification Section 009500**.

(5) **Provide Evidence** of Compliance with the Responsible Employer Ordinance **(REO)**. **As per Specification Section 009500.**

(6) **A Certificate of Eligibility** certifying the bidders qualification, in the respective filed sub trade category being bid, issued by the Division of Capital Asset Management, DCAM (formerly the Division of Capital Planning and Operations, DCPO), showing that the Bidder has been approved to bid on projects the size and nature of this project. In order to be eligible to be awarded this contract, a bidder must be certified in the appropriate category and for the total Cost of the respective work including all alternates elected (if applicable) to be taken by the Owner.

(7) **A Contractor Update Statement**, DCPO FORM CQ3. It is the Bidder's responsibility to obtain the necessary forms and make application to DCAM (DCPO) in sufficient time for DCAM (DCPO) to evaluate the application and issue a Certificate of Eligibility. A sample of the **Contractor Update Statement**, DCAM FORM CQ3 (revised December, 1999) is located at the end of Section 001500.

(8) Bid deposit for the sub-bid in the amount of **five (5) percent** of the value of the bid, or a bid bond.

(9) **Foreign Corporation Certificate of Registration** from the Commonwealth of Massachusetts State Secretary (if applicable).

(10) **CORI Form**

(11) **Wage Theft Form**

Plans and Specifications will be available on Wednesday, September 18, 2024, at the Department of Public Facilities, 50 Officer Manny Familia Drive, Worcester, MA 01605, Phone: (508) 799-8588, Fax: (508) 799-8188. Plans and specifications are also available at http://bids.worcesterma.gov/.

Contract Documents may be viewed, but not removed, at the following locations:

Department of Public Facilities
50 Officer Manny Familia Drive (formerly Skyline Drive)
Worcester, MA 01605

WAGE RATES - Bids are subject to the provisions of M.G.L., Chapter 149, Section 44A to J inclusive, as amended to date, and such other Federal, State and Municipal laws or regulations.

Attention of bidders is particularly called to the requirements as to conditions of employment to be observed and to the fact that not less than the minimum wage rates set forth in the Contract Documents shall be paid on this project. Minimum wage rates are per M.G.L., Chapter 149, Sections 26 & 27 inclusive.

GRANT/FUNDING REQUIREMENTS All or a portion of this project may be funded through the American Rescue Plan Act ("ARPA") and the Coronavirus State and Local Fiscal Recovery Funds ("SLFRF") (collectively for this paragraph, "ARPA"). Successful bidder is responsible to be familiar and comply with ARPA requirements applicable to its work pursuant to the contract, including but not limited to those promulgated by the Department of the Treasury, including 31 CFR Part 35, 2 CFR Part 200 ("Uniform Guidance"), including but not limited to 2 CFR 200.327and 2 CFR Part 200, Appendix II, and the Treasury's administrative guidance in the form of responses to FAQs. Without limiting such responsibility, the successful bidder shall maintain any and all records required to document its compliance with ARPA requirements and shall promptly submit such records to Owner upon Owner's request. This requirement shall survive project completion. Additionally, all materials and services under this bid/contract must comply with Buy American requirements (e.g., 2 CFR 200.322), compliance with the Davis Bacon Act, payments bonds if the project value exceeds $100,000 in accordance with 2 CFR 200.326. The successful bidder shall have a current and active registration with SAM.gov and shall have an active federal UEI number).

MINORITY/WOMEN BUSINESS ENTERPRISE PROGRAM - The City of Worcester has established goals for the participation of minorities and women workers, contractors, subcontractors, and suppliers on all City projects. Bids must demonstrate the contractor's ability to utilize minorities and women in all phases of this project. The City of Worcester has established a program to enhance contract opportunities to minority and women-owned businesses through its Minority/Women Business Enterprise Program. This program contains minimum participation goals of ten (10) percent by MBE's and fifteen (15) percent by WBE's calculated as a percentage of the total bid price. Accordingly, all general bidders and filed sub-bidders must execute and submit with their respective bids M/WBEP **Form EOO-101**, Contractor's and Filed Subcontractor's Certification.

RESPONSIBLE EMPLOYER ORDINANCE - The performance of the work derived from this bid is subject to the City's Responsible Employer Ordinance, Chapter 2, Section 35 of WRO (2008). Accordingly, all general bidders and filed sub-bidders must execute and submit with their respective bids **Form REO-101 page 2**, Contractor's and Filed Subcontractor's Initial Certification.

NOISE ORDINANCE **– All Contractors must adhere to the provision of § 1A(e)(9) of chapter nine of the Revised Ordinances of the city by limiting their on-site, noise producing construction and related work to the hours specified by said ordinance.**

PRE-BID CONFERENCE - The pre-bid conference will be held on 10:00 a.m., Thursday, September 26, at the project site, Lincoln Elementary School, 549 Lincoln Street, Worcester, MA 01605 beginning at 10:00 a.m. with a brief overview and tour of the construction areas. It is recommended that all Bidders attend this meeting.

WORK UNDER SEPARATE CONTRACTS AND BY OWNER – The Owner may do other work during construction with its own forces or by separate contract.

COMMENCEMENT OF WORK AND TIME OF COMPLETION – The selected General Bidder must agree to commence work within five (5) days of the execution of a General Contract and to be substantially complete by August 21, 2026. ARPA funds must be committed no later than December 31, 2024 and expended no later than December 31, 2026.

The Awarding Authority reserves the right to waive any informality in, or to reject any or all general bids, if it were in the public interest to do so. In inviting sub-bids in connection with such a contract, the Awarding Authority shall reserve the right to reject any sub-bid on any sub-trade, if it determines that such sub-bid does not represent the sub-bid of a person competent to perform the work as specified, or that less than three (3) such sub-bids were received and that the prices are not reasonable for acceptance without further competition.

The City of Worcester is an equal opportunity/affirmative action employer.

City of Worcester, Massachusetts
Executive Office of the City Manager

END OF SECTION

CITY OF WORCESTER

INSTRUCTIONS TO BIDDERS

SECTION 1 - INTRODUCTION; DEFINITIONS

In accordance with an Advertisement for Bids, a copy of which is bound herewith, the City of Worcester (the "Owner") has invited bids for the **HANDICAP ACCESSIBILIY UPGRADES FOR CHALLENGE & REACH ACADEMY, GERALD CREAMER SCHOOL, LINCOLN ELEMENTARY SCHOOL, THORNDYKE ROAD ELEMENTARY SCHOOL**.

1.1 These Instructions to bidders (the "Instructions") are intended to assist bidders (which term as used in these Instructions shall include general bidders and sub-bidders if applicable) in the preparation of their bids, to call attention to various legal requirements and to set forth certain conditions upon which bids are submitted and received.

1.2 The award of the contract is governed by Chapter 149, Sections 44A-44J of the Massachusetts General Laws. Certain provisions of the foregoing statute and of other applicable statutes are summarized in these Instructions. Whenever these Instructions or any other contract documents set forth or summarize applicable statutory provisions, whether or not the statutes have been specifically referred to, such summaries are for convenience only, do not purport to be complete or correct as summaries of any particular material, and shall in no respect supersede, expand or limit rights or duties of the Owner or bidders in matters governed by the statute.

1.3 The following definitions shall apply in these Instructions and in the other Contract Documents:

(1) The term "bidding documents" shall include the Advertisement for Bids, these Instructions, the bid forms, contract forms and other Contract Documents bound herewith, the Drawings, the Specifications, and all Addenda issued prior to receipt of bids.

(2) The terms "Addenda" and "Addendum" shall mean written documents and/or drawings issued by the Owner prior to execution of the contract, which supplement, modify, correct, explain or interpret the bidding documents.

(3) All definitions set forth in the Conditions of the Contract or the other Contract Documents as therein defined are applicable to these Instructions and to the other bidding documents.

SECTION 2 - AVAILABILITY OF CONTRACT DOCUMENTS

2.1 Plans and specifications are available at http://bids.worcesterma.gov/.

2.2 The Owner shall prepare and update daily a list of persons who have requested a set of drawings and specifications for the project, which list shall be sent each week to the Central Register published by the Massachusetts Secretary of State.

SECTION 3 - EXAMINATION OF SITE AND CONTRACT DOCUMENTS; PRE-BID CONFERENCE

3.1 Before submitting a bid, each bidder must: (a) thoroughly examine the Contract Documents (b) visit the site to fully examine and acquaint himself with local conditions that may in any manner affect cost, progress or performance of the Work, (c) familiarize himself with federal, state and local laws, ordinances, rules and regulations that may in any manner affect cost, progress or performance of the Work, and (d) study and carefully correlate his observations with the requirements of the Contract Documents. Failure of a bidder to visit the site and acquaint himself with the Contract Documents or to attend the pre-bid conference, if any, shall in no way relieve the bidder from any obligation with respect to his bid.

3.2 On request, the Owner will provide each bidder access to the site to conduct such reasonable investigations and tests as such bidder deems necessary to prepare his bid.

3.3 Each bidder shall promptly notify Jeremy C. Flansburg, Special Project Coordinator, City of Worcester, Department of Public Facilities, 50 Officer Manny Familia Drive, Worcester, MA 01605, (508) 688-2694 of any ambiguity, inconsistency, or error he may discover upon examination of the Contract Documents, the site or other local conditions. The submission of a bid will constitute a representation by the bidder that he has complied with every requirement of this Section 3 and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance of the work of this contract.

3.4 A pre-bid conference will be held at the place and time set forth in the Advertisement for Bids.

SECTION 4 - ADDENDA AND INTERPRETATION OF CONTRACT DOCUMENTS

4.1 All questions and requests for clarifications or interpretations of the meaning of the Contract Documents shall be in writing, or Facsimile Telephone Transmission (FAX), addressed to Jeremy C. Flansburg, Special Project Coordinator, City of Worcester, Department of Public Facilities, 50 Officer Manny Familia Drive, Worcester, MA 01605, phone: (508) 799-8588, fax (508) 799-8188, email: flansburgj@worcesterma.gov and to be given consideration must be received at least five (5) days prior to the date fixed for opening of bids.

4.2 Clarifications or such interpretations and any supplemental instructions or forms, if issued, will be issued in the form of written Addenda and when possible, not later than two (2) days before the date fixed for opening of bids. Addenda will be sent by email to the contact listed on the receipt for drawings and specifications. Each bidder shall be responsible for determining that he has received all Addenda issued, and failure of any bidder to receive any such Addendum shall not relieve such bidder from any obligation under its bid as submitted. Failure to acknowledge receipt of an Addendum on the Bid Form by the Bidder may be cause for rejection of the Bid.

4.3 All Addenda so issued shall become part of the Contract Documents.

4.4 Oral clarifications or interpretations will be of no legal effect. The Owner will not be responsible for, and no bidder may rely upon or use as the basis of a claim against the Owner or the Architect, any information, explanation or interpretation of the Contract Documents rendered in any fashion except as herein provided.

SECTION 5 - PRE QUALIFICATION BY DIVISION OF CAPITAL ASSET MANAGEMENT (DCAM formerly DCPO) (CHAPTER 149 PROJECTS)

5.1 **GENERAL BIDS** on this contract must be accompanied by a copy of a Certificate of Eligibility issued by the Deputy Commissioner of the Massachusetts Division of Capital Asset Management (formerly the "DCPO") showing that the bidder has the classification and capacity rating to perform the work required. In order to be eligible to be awarded this contract, a general bidder must be certified by the DCAM for the total Project Cost, including all alternates elected (if applicable) to be taken by the Owner, and certified in the category of General Building Construction.

5.2 Each general bid must also be accompanied by a Contractor Qualifications Statement Update ("Update Statement"). The Owner will furnish copies of the Update Statement form to bidders on request. (Note: A sample copy of the Update Statement is located at the end of this Section.). Any general bid submitted without a currently valid Certificate of Eligibility and Update Statement shall be invalid and will not be accepted by the Owner.

5.3 The Owner may at its discretion give the bidder notice of defects or omissions in the bidder's Update Statement and an opportunity to make revisions to this statement. A contractor's bid shall not be rejected if there are mistakes or omissions of form in its Update Statement, provided the contractor promptly corrects those mistakes or omissions upon request by the Owner.

5.4 The Owner will consider the information contained in the Update Statement, which it may verify by its own investigation, and material that it may request from the DCAM according to 810 CMR 4.03 (12) in determining whether the low bidder is eligible for contract award pursuant to M.G.L. Chapter 149, Section 44A (2). The Owners eligibility review of the low bidder will concentrate on the bidder's performance since its last certification by the DCAM, provided, however, that the Owner may bring information to the DCAM's attention concerning a contractor's qualifications, if the DCAM was not aware of that information when it certified the contractor.

5.5 The low bidder may not be awarded a contract which, when added to the cost to complete all other currently held contracts, would exceed the contractor's aggregate rating limit.

(1) The Owner will use the information provided in the Update Statement to compute the amount of work the bidder has underway.

(2) If the contractor provides the Owner with evidence that its outstanding balance of contracts will be within its aggregate rating limit by the start date of the project for which it is low bidder, the Owner may, at its discretion, make the contract award.

5.6 Should the lower bidder be determined not to be eligible, the Owner shall review the next low bidder's eligibility, in accordance with these procedures and the applicable legal requirements until a bidder is determined to be eligible for contract award.

5.7 The contract shall not be awarded to any bidder whose submitted background information when investigated and verified by the Owner, raises significant question as to his ability to successfully complete the project in question due to problems with his competence and responsibility.

SECTION 6 - WAGE RATES

6.1 Minimum rates of wages for work performed under this contract will be as predetermined by the Commissioner of Labor and Industries of the Commonwealth of Massachusetts in accordance with the provisions of Sections 26 to 27C, inclusive, of Chapter 149 of the Massachusetts General Laws.

6.2 Section 27B of said Chapter 149 provides record-keeping requirements for contractors and subcontractors with respect to employees, hours, wages and other matters.

6.3 Bidders' attention is called to Section 148 of Chapter 149 of the Massachusetts General Laws, relating to the weekly payment of wages.

SECTION 7 - SALES TAX

7.1 Section 6(f) of Chapter 54H of the Massachusetts General Laws exempts from Massachusetts sales tax, building materials and supplies to be used in the project, and bidders shall not include in their bids any amount therefore. The number of the certificate granted by the Commissioner of Revenue for use in obtaining the exemption may be obtained from the City of Worcester.

SECTION 8 - PREPARATION AND SUBMISSION OF BIDS

8.1 Each bid shall be submitted upon the bid forms furnished by the Owner, copies of which are bound with the bid documents. The bid forms may be submitted without the balance of the Contract Documents. All blank spaces shall be filled in, in ink or typewritten, in words or figures. The bid prices for each item on the bid forms shall be stated in both words and figures. Where itemized lump sum or unit prices are called for, the bidder shall provide all such prices. In the event of a discrepancy between prices written in words and prices written in figures, the written words shall govern. In the event of a discrepancy between the indicated sum of any column of figures and the correct sum thereof, the correct sum shall govern. The bid shall state the legal name of the bidder and shall be signed in ink by a person or persons legally authorized to bind the bidder to a contract. The name and title of the person or persons signing the bid shall be typed or printed below the signatures.

8.2 Each bid and the bid deposit (described below) shall be submitted to the Owner at the place stated in the Advertisement for Bids in a sealed envelope bearing on the outside the name of the bidder, his address and the title of the project for which the bid is submitted. If forwarded by mail, the sealed bid and the bid deposit shall be enclosed in an envelope with the notation "BID ENCLOSED" on the face and addressed as indicated in the Advertisement for Bids. A Certificate of Eligibility and an Update Statement in accordance with Section 5 shall if applicable, accompany each general bid.

8.3 Each sub-bid shall be submitted as specified in Paragraph 8.2 above, and, in addition, the notation "SUB-BID" and the name of the sub-trade for which the sub-bid is submitted shall be placed on the outside of the sealed envelope containing the sub-bid.

8.4 The Form for General Bid requires the general bidder to indicate whether performance and payment bonds will be required by the general bidder to be furnished by one or more filed sub-bidders. If the general bidder requests one or more filed sub-bidders to furnish such bonds, the general bidder must pay the premiums for all such bonds requested, and must include the costs of such premiums in his general bid.

8.5 Section 39L of Chapter 30 of the Massachusetts General Laws prohibits the Owner from entering into a contract for this work with, and shall not approve as a subcontractor furnishing labor and materials for a part of any such work, a foreign corporation which has not filed with the Owner, a certificate of the State Secretary stating that such corporation has complied with Massachusetts General Laws Chapter 181, Sections 3 and 5. Therefore, every Foreign Corporation, whether submitting a general or sub-bid, must furnish a certified copy of its Certificate of Registration that has been duly filed with the State Secretary's office. Any bid, general or sub, of a foreign corporation submitted without a Certificate may be invalid and may be rejected pursuant to Section 11.

SECTION 9 - RECEIPT OF BIDS

9.1 All bidders are cautioned to allow ample time for transmittal of bids. Bidders are solely responsible for delivery to and receipt by the Owner of bids at the place stated in the Advertisement for Bids. Bids received after the specified time or at other than the specified location will not be accepted or recognized and will be returned to the Bidder unopened. The time of receipt will determine the acceptability of mailed bids, regardless of postmark.

9.2 Any bid may be withdrawn by the bidder or his duly authorized representative by written notice received by the Owner at the address for receipt of bids specified in the Advertisement for Bids prior to the time scheduled for the opening of such bids or authorized postponement thereof. No bid may be withdrawn for sixty (60) days, Saturdays, Sundays and legal holidays excluded, after the opening of general bids. No telephone or telegraphic bid, change in bid or withdrawal of bid will be received or recognized. A bid may be amended or modified only by withdrawing the bid and resubmitting another bid prior to the time for the opening of bids.

9.3 Bids will be opened and read publicly at the place and time stated in the Advertisement for Bids or the authorized postponement thereof. Bidders or their authorized representatives are invited to be present.

SECTION 10 - BID DEPOSIT

10.1 A bid deposit in the form of a bid bond, or cash, or a certified check must accompany each bid, or a treasurer's or cashier's check issued by a responsible bank or trust company, payable to the City of Worcester. A bid bond shall be (a) in form satisfactory to the Owner and substantially conforming to the sample contained in the Contract Documents, (b) with a Surety company qualified to do business (licensed) in the Commonwealth of Massachusetts and satisfactory to the Owner, and conditioned upon the faithful performance by the principal of the agreements contained in the bid. The bid deposit shall be in the amount of five (5) percent of the value of the bid.

SECTION 11 - REJECTION OF BIDS

11.1 The Owner reserves the right to reject any or all general bids if it were in the public interest to do so. The Owner reserves the right to reject any sub-bid on any sub-trade, if it determines that such sub-bid does not represent the sub-bid of a person competent to perform the work as specified or that less than three (3) such sub-bids were received and that the prices are not reasonable for acceptance without further competition.

11.2 Within two (2) days, Saturdays, Sundays and legal holidays excluded, after opening sub-bids, the Owner will reject every sub-bid which is not accompanied by the required bid deposit or which otherwise does not conform to statutory requirements, or which is on a form not completely filled in, or which is incomplete, conditional or obscure, or which contains any addition not called for; provided, however, that the failure of the Owner to reject such a sub-bid within such period shall not validate such a sub-bid nor preclude the Owner from subsequently rejecting it.

11.3 The Owner shall reject every general bid and filed sub-bid which is not accompanied by the required bid deposit, or which otherwise does not conform to the statutory requirements or the bid documents.

11.4 The Owner reserves the right to reject any and all general bids which contains erasures, alterations, additions, errors or irregularities of any kind, or which contains proposed prices for any class or item of work which are, in the judgment of the Owner, substantially less or more than the actual cost to complete the work; provided, however, that the Owner reserves the right to waive any and all informalities as to form. Matters as to substance shall not be waived.

SECTION 12 - AWARD OF CONTRACT

12.1 The general contract will be awarded to the lowest responsible and eligible general bidder complying with the conditions and requirements provided in these Instructions, the bid forms and the other bid documents.

12.2 Award of the contract will be made within thirty (30) days, Saturdays, Sundays and legal holidays excluded, after (i) the opening of the general bids or (ii) the receipt by the Owner of any approvals necessary from federal or state agencies in connection with the project, whichever is later.

12.3 The successful bidder will be notified in writing, by mail or otherwise, that their bid has been accepted and that he has been awarded the contract. The successful bidder shall execute the contract and furnish the required bonds, at the offices of the Owner if requested, within five (5) days, Saturdays, Sundays and legal holidays excluded, after presentation of the contract to him or notice to him that the contract is ready for execution.

12.4 If the bidder selected as the general contractor fails to perform his agreement to execute the contract in accordance with the terms of his bid and furnish a performance bond and also a labor and materials payment bond as stated in his bid, the award will be made to the next lowest responsible and eligible general bidder, subject to the provisions of Sections 44A-44J, inclusive, of said Chapter 149 of the Massachusetts General Laws.

12.5 After the apparent lowest eligible and responsible general bidder is selected, it shall promptly confer with the Owner on the question of sub-bidders. Upon the Owner's acceptance of the sub-bidders to be utilized, the selected bidder shall promptly present subcontracts to its filed sub-bidders, and in all cases, the presentment of subcontracts must be made a minimum of six days prior to the presentment of the general contract to the general bidder by the Owner. The general bidder shall submit copies of the executed subcontracts to the Owner as a prerequisite to the Owner's presentment of the general contract. As provided in the statutory subcontract form, the validity of the subcontracts is contingent upon execution of the general contract. [Massachusetts General Laws Chapter 149, Section 44F(4)(c)].

SECTION 13 - CERTIFICATES AND DOCUMENTS TO BE FURNISHED PRIOR TO EXECUTION OF THE CONTRACT

13.1 If the amount or the estimated amount of this contract is greater than $100,000, then, pursuant, to Section 39R of Chapter 30 of the Massachusetts General Laws, the Contract Documents require the general contractor to make and keep books, records and accounts pertaining to the contractor's financial affairs and to file with the Deputy Commissioner of Capital Asset Management and the Owner the statements and certificates described below in Paragraphs 13.2, 13.3 and 13.4.

13.2 Prior to the execution of the contract the general contractor shall file with the Owner:

(1) A statement of management controls.
(2) A statement prepared and signed by an independent certified public accountant, stating that he and or she has examined the statement of management on internal accounting controls, and expressing an opinion as to:

(a) whether the representations of management are consistent with the result of management's evaluation of the system of internal accounting controls; and

(b) whether such representations of management are, in addition, reasonable with respect to transactions and assets in amounts, which would be material when measured in relation to the applicant's financial statements.

13.3 Prior to execution of the contract, and annually during the term of the contract, the general contractor shall file with the Deputy Commissioner of Capital Asset Management a Financial Statement prepared by an independent certified public accountant on the basis of an audit by such accountant. All statements shall be accompanied by an accountant's report.

13.4 Pursuant to Sections 49A of Chapter 62C of the Massachusetts General Laws the contractor must certify that it has complied with all laws of the Commonwealth of Massachusetts relating to taxes. A form of certificate for this purpose is included in the Contract Documents.

13.5 Prior to commencement of work, the contractor must furnish to the Owner certificates evidencing required insurance coverage in accordance with the provisions of the insurance requirements contained in the Supplementary General Conditions of the Contract.

13.6 The affidavit of compliance with certain laws of the Commonwealth relating to corporations, and evidence of corporate authority with respect to execution of the contract documents on behalf of the contractor, on the form contained in the bidding documents, must be furnished by the contractor to the Owner at the time of execution of the contract.

13.7 The general contractor as stated in the bid form must furnish a performance bond and a labor and materials payment bond, each in the amount of the contract sum. Such bonds must be on the forms similar to those contained in the bid documents and must be executed and delivered to the Owner at the time of execution of the contract. Each attorney-in-fact who executes such a bond on behalf of the surety must affix thereto a certified and current copy of his power of attorney.

13.8 A performance and a labor and materials payment bond furnished by a subcontractor, at the request of a general contractor, shall secure the performance of the sub-contract by the subcontract; and shall indemnify and hold harmless the general contractor and the surety or sureties under the labor and materials payment bond furnished by the general contractor to the Owner against (1) any and all and expense arising out of any and all claims in connection with the performance of said subcontract which would be required to be paid under the labor and materials payment bond furnished by the general contractor to the Owner and (2) attorney's fees in the event that the subcontractor, after the notice, fails to assume the defense and defend such claims.

13.9 The subcontract agreement between the general contractor and each filed subcontractor shall be in the form contained in the Contract Documents bound with the instructions, as required by Section 44 F of said Chapter 149 of the Massachusetts General Laws.

SECTION 14 - FILED SUB-BID PROCEDURE

14.1 As stated in the Advertisement for Bids, the Owner has requested FILED SUB-BIDS on the following classes of work:

(1) Section 04 20 00 - Unit Masonry including 04 21 11
(2) Section 05 50 00 – Metal Fabrications including 05 51 00, 05 52 13, and 05 55 16
(3) Section 07 25 00 – Weather Barriers including 07 27 26 and 07 92 00
(4) Section 09 30 00 – Tiling
(5) Section 09 51 13 – Acoustical Panel Ceilings
(6) Section 09 65 16 – Resilient Flooring including 09 65 13
(7) Section 09 91 13 – Painting
(8) Section 14 24 00 – Hydraulic Elevator including 14 24 01
(9) Section 21 00 00 – Fire Suppression
(10) Section 22 00 00 – Plumbing

(11) Section 23 00 00 - Heating, Ventilating and Air Conditioning

(12) Section 26 00 00 – Electrical including 27 05 00, 27 41 00, and 28 10 00

14.2 Every sub-bidder duly filing a sub-bid with the Owner shall be bound thereby to every general bidder not excluded therein from the use thereof; and any variance from such sub-bid communicated to a general bidder shall be of no effect.

14.3 Each sub-bidder shall list in the sub-bid form the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the section of the specifications for that sub-trade requires such listings; provided that in the absence of a contrary provision in the specification, any sub-bidder may, without listing any bid price, list his own name for any such class of work or part thereof and perform that work with persons on his own payroll if such sub-bidder after sub-bid opening, shows to the satisfaction of the Owner that he does customarily perform such class of work or the part thereof with employees on his own payroll who are mechanics or laborers referred to in Section 26 of said Chapter 149, of the Massachusetts General Laws, and is qualified so to do.

14.4 **FILED SUB-BIDS** on this contract must be accompanied by a copy of a Certificate of Eligibility issued by the Deputy Commissioner of the Massachusetts Division of Capital Asset Management (formerly the "DCPO") showing that the bidder has the classification and capacity rating to perform the work required. In order to be eligible to be awarded this contract, each filed sub-bidder must be certified by the DCAM for their total Project Cost, including all alternates elected (if applicable) to be taken by the Owner, and certified in their respective trade category.

14.5 Each filed sub-bid must also be accompanied by a Contractor Qualifications Statement Update ("Update Statement"). The Owner will furnish copies of the Update Statement form to bidders on request. (Note: A sample copy of the Update Statement is located at the end of this Section.). Any filed sub-bid submitted without a currently valid Certificate of Eligibility and Update Statement shall be invalid and will not be accepted by the Owner.

14.6 Not later than the second day, Saturdays, Sundays and legal holidays excluded, before the day fixed by the Owner for the opening of general bids, the Owner shall mail to every person on record as having taken a set of Drawings and Specifications a list of sub-bidders arranged by sub-trades and listing for each sub-trade the name, address and sub-bid price of every sub-bidder submitting a sub-bid thereon not rejected by the Owner, and the general bidders excluded from using such sub-bid. A person shall not be named by a general bidder as a sub-bidder for a sub-trade on the general bid form unless such person is included for such sub-trade in said list.

14.7 All sub-bidders, when finally selected, shall be notified in writing of their selection with forty-eight (48) hours thereafter by the general bidder. The selected general bidder and each of the selected sub-bidders shall promptly execute the subcontract agreements, and fully executed copies of all subcontract agreements shall be delivered to the Owner prior to presentment of the Owner-Contractor Agreement to the selected general bidder for execution. The selected General Bidder shall promptly and without delay, notify the Owner of any selected sub-bidder who fails to execute a sub-contract or furnish the requisite bonds and/or insurance within five (5) days of presentment thereof.

SECTION 15 - MINORITY AND WOMEN BUSINESS ENTERPRISE PROGRAM

15.1 The Owner has established goals for the participation of minority and women contractors and subcontractors on all City projects. **In furtherance thereof, the City of Worcester's Supplemental Equal Employment Opportunity Anti-Discrimination And Affirmative Action Program is included in the Bidding Documents, and all bidders shall comply with the requirements set forth therein.** Any bidder who has any questions about the forms and procedures should contact Jeremy Flansburg, Special Project Coordinator, Deparment of Public Facilities, Room C3, 50 Officer Manny Familia Way, Worcester, MA 01605, Telephone: (508) 799-8561.

SECTION 16 - RESPONSIBLE EMPLOYER ORDINANCE

16.1 The performance of the work derived from this bid is subject to the city's Responsible Employer Ordinance, Chapter 2, Section 35 of the Worcester Revised Ordinances (2008). Bidders are hereby instructed to review and familiarize themselves with the requirements thereof. The complete text of the ordinance is contained in the Supplementary General Conditions - Part I.

SAMPLE DCAM FORM CQ3
CERTIFICATE OF ELIGIBILITY UPDATE STATEMENT
ON THE FOLLOWING PAGES

SPECIAL NOTICE TO AWARDING AUTHORITY
BIDDERS' UPDATE STATEMENTS ARE NOT PUBLIC RECORDS AND ARE NOT OPEN TO PUBLIC INSPECTION (M.G.L. C.149, §44D)

Commonwealth of Massachusetts
Division of Capital Asset Management

UPDATE STATEMENT

TO ALL BIDDERS AND AWARDING AUTHORITIES

A COMPLETED AND SIGNED UPDATE STATEMENT MUST BE SUBMITTED WITH EVERY BID FOR A CONTRACT SUBJECT TO M.G.L. C.149, §44A. ANY BID SUBMITTED WITHOUT AN APPROPRIATE UPDATE STATEMENT IS INVALID AND MUST BE REJECTED.

AWARDING AUTHORITIES

If the Awarding Authority determines that the bidder does not demonstrably possess the skill, ability, and integrity necessary to perform the work on the project, it must reject the bid.

BIDDER'S AFFIDAVIT

I swear under the pains and penalties of perjury that I am duly authorized by the bidder named below to sign and submit this Update Statement on behalf of the bidder named below, that I have read this Update Statement, and that all of the information provided by the bidder in this Update Statement is true, accurate, and complete as of the bid date.

_____ Bid Date	_____ Print Name of Bidder
_____ Project Number (or name if no number)	_____ Business Address
_____ Awarding Authority	_____ Telephone Number
SIGNATURE⇨	_____ **Bidder's Authorized Representative**

INSTRUCTIONS

INSTRUCTIONS TO BIDDERS

- You must give complete and accurate answers to all questions and provide all of the information requested. MAKING A MATERIALLY FALSE STATEMENT IN THIS UPDATE STATEMENT IS GROUNDS FOR REJECTING YOUR BID AND FOR DEBARRING YOU FROM ALL PUBLIC CONTRACTING.
- Information is to cover the period from the date your most recent annual Certificate of Eligibility was issued (not extended) to the date of the bid.
- You must use this official form of Update Statement. Copies of this form may be obtained from the awarding authority and from the Asset Management Web Site: www.state.ma.us/cam/.
- If additional space is needed, please copy the appropriate page of this Update Statement and attach it as an additional sheet.
- See the section entitled "Bidding Limits" in the *Instructions to Awarding Authorities* for important information concerning your bidding limits.

INSTRUCTIONS TO AWARDING AUTHORITIES

Determination of Bidder Qualifications

- It is the awarding authority's responsibility to determine who is the lowest eligible and responsible bidder. You must consider all of the information in the low bidder's Update Statement in making this determination. Remember: this information was not available to the Division of Capital Asset Management at the time of certification.
- The bidder's performance on the projected listed in Parts 1 and 2 must be part of your review. Contact the project references.
- AWARDING AUTHORITIES ARE STRONGLY ENCOURAGED TO REVIEW THE LOW BIDDER'S ENTIRE CERTIFICATION FILE AT THE DIVISION OF CAPITAL ASSET MANAGEMENT. Telephone (617) 727-9320 for an appointment.

Bidding Limits

Single Project Limit: The total amount of the bid, including all alternates, may not exceed the bidder's Single Project Limit.

Aggregate Work Limit: The annual value of the work to be performed on the contract for which the bid is submitted, when added to the annual cost to complete the bidder's other currently held contracts, may not exceed the bidder's Aggregate Work Limit. Use the following procedure to determine whether the low bidder is within its Aggregate Work Limit:

Step 1 Review Update Statement Question #2 to make sure that all requested information is provided and that the bidder has accurately calculated and totaled the annualized value of all incomplete work on its currently held contracts (column 9).

Step 2 Determine the annual dollar value of the work to be performed on your project. This is done as follows:

(i) If the project is to be completed in less than 12 months, the annual dollar value of the work is equal to the full amount of the bid.

(ii) If the project will take more than 12 months to complete, calculate the number of years given to complete the project by dividing the total number of months in the project schedule by 12 (calculate to 3 decimal places), then divide the amount of the bid by the calculated number of years to find the annual dollar value of the work.

Step 3 Add the annualized value of all of the bidder's incomplete contract work (the total of column 9 on page 5) to the annual dollar value of the work to be performed on your project. **The total may not exceed the bidder's Aggregate Work Limit**.

Correction of Errors and Omissions in Update Statements

Matters of Form: An awarding authority shall not reject a contractor's bid because there are mistakes or omissions of form in the Update Statement submitted with the bid, provided the contractor promptly corrects those mistakes or omissions upon request of the awarding authority. [810 CMR 4.09(1)].

Correction of Other Defects: An awarding authority may, in its discretion, give a contractor notice of defects, other than mistakes or omissions of form, in the contractor's Update Statement, and an opportunity to correct such defects, provided the correction of such defects is not prejudicial to fair competition. An awarding authority may reject a corrected Update Statement if it contains unfavorable information about the contractor that was omitted from the Update Statement filed with the contractor's bid. [810 CMR 4.09(2)].

PART 1 - COMPLETED PROJECTS

LIST ALL PUBLIC AND PRIVATE *BUILDING* PROJECTS YOUR FIRM HAS COMPLETED SINCE THE DATE YOUR CURRENT CERTIFICATE OF ELIGIBILITY WAS ISSUED (NOT EXTENDED).*

PROJECT TITLE & LOCATION	WORK CATEGORY	CONTRACT PRICE	START DATE	DATE COMPLETED

Attach additional sheets if necessary

* If your firm has been terminated from a project prior to completion of the work or has failed or refused to complete its work under any contract, full details and an explanation must be provided. See Part 3 of this Update Statement.

Division of Capital Asset Management
Form CQ 3 - Revised August, 2000

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PROVIDE THE FOLLOWING REFERENCE INFORMATION FOR EACH COMPLETED PROJECT LISTED ON THE PREVIOUS PAGE.

PROJECT TITLE	COMPANY NAME	CONTACT PERSON	TELEPHONE
	OWNER		
	DESIGNER		
	GC		
	OWNER		
	DESIGNER		
	GC		
	OWNER		
	DESIGNER		
	GC		
	OWNER		
	DESIGNER		
	GC		
	OWNER		
	DESIGNER		
	GC		
	OWNER		
	DESIGNER		
	GC		

Is your company or any individual who owns, manages or controls your company affiliated with any owner, designer or general contractor named above, either through a business or family relationship? ☐ YES ☐ NO

Are any of the contact persons named above affiliated with your company or any individual who owns, manages or control your company, either through a business or family relationship? ☐ YES ☐ NO

If you have answered YES to either question, explain. _____

_____

PART 2 - CURRENTLY HELD CONTRACTS

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LIST ALL PUBLIC AND PRIVATE BUILDING AND NON-BUILDING *CONSTRUCTION* PROJECTS YOUR FIRM HAS UNDER CONTRACT ON THIS DATE REGARDLESS OF WHEN OR WHETHER THE WORK COMMENCED.

1	2	3	4	5	6	7	8	9
PROJECT TITLE & LOCATION	WORK CATEGORY	START AND END DATES	ON SCHEDULE (yes / no)	CONTRACT PRICE	% NOT COMPLETE	$ VALUE OF WORK NOT COMPLETE (col. 5 x. col. 6)	NO. OF YEARS REMAINING (see note below)	ANNUALIZED VALUE OF INCOMPLETE WORK (col. 7 ÷ col. 8)

ANNUALIZED VALUE OF ALL INCOMPLETE CONTRACT WORK (Total of Column 9) $_____

Column 8
- If less than one year is left in the project schedule, write 1.
- If more than 12 months are left in the project schedule, divide the number of months left in the project schedule by 12 (calculate to three decimal places).

PROVIDE THE FOLLOWING REFERENCE INFORMATION FOR EACH INCOMPLETE PROJECT LISTED ON THE PREVIOUS PAGE.

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PROJECT TITLE	COMPANY NAME	CONTACT PERSON	TELEPHONE
	OWNER		
	DESIGNER		
	GC		
	OWNER		
	DESIGNER		
	GC		
	OWNER		
	DESIGNER		
	GC		
	OWNER		
	DESIGNER		
	GC		
	OWNER		
	DESIGNER		
	GC		
	OWNER		
	DESIGNER		
	GC		

Is your company or any individual who owns, manages or controls your company affiliated with any owner, designer or general contractor named above either through a business or family relationship? ☐ YES ☐ NO

Are any of the contact persons named above affiliated with your company or any individual who owns, manages or control your company, either through a business or family relationship? ☐ YES ☐ NO

If you have answered YES to either question, explain. _____

_____

_____

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PART 3 - PROJECT PERFORMANCE

Please answer the following questions. Information is to cover the period from the date your current Certificate of Eligibility was issued to the bid date.

If you answer YES to any question, on a separate page provide a complete explanation. Include all details [project name(s) and location(s), names of all parties involved, relevant dates, etc.].

	YES	NO
A. Has your firm been terminated on any contract prior to completing its work?	☐	☐
B. Has your firm failed or refused either to perform or complete any of its work under any contract prior to substantial completion?	☐	☐
C. Has your firm failed or refused to complete any punchlist work under any contract?	☐	☐
D. Has your surety taken over or been asked to complete any of your work under any contract?	☐	☐
E. Has your surety made payment to a materials supplier or other party under your payment bond on any contract?	☐	☐
F. Has any subcontractor filed a demand for direct payment with an awarding authority on a public project for any of your contracts?	☐	☐
G. Have any of your subcontractors or suppliers filed litigation to enforce a mechanic's lien against property in connection with work performed or materials supplied under any of your contracts?	☐	☐
H. Have there been any deaths of employee or others occurring in connection with any of your projects?	☐	☐
I. Has any employee or other person suffered an injury resulting in complete disability in excess of thirty working days in connection with any of your projects?	☐	☐

PART 4 - LEGAL PROCEEDINGS

Please answer the following questions. Information is to cover the period from the date your current Certificate of Eligibility was issued to the bid date.

The term "Administrative Proceeding" as used in this Update Statement includes (i) any action or proceeding brought by a governmental agency, department or officer to enforce any law, regulation, code or other legal requirement, except for those brought in state or federal courts, and (ii) any action taken by a governmental agency, department or officer imposing penalties, fines or other sanctions for failure to comply with any such legal requirement.

If you answer YES to any question, on a separate page provide a complete explanation of each proceeding and any judgement or decision. Include all details (name of court or administrative agency, title of case or proceeding, case number, date action was commenced, date judgement or decision was entered, fines or penalties imposed, etc.).

YES **NO**

A. Have any judicial proceedings (other than criminal proceedings) been brought or concluded adversely against your firm or a principal or officer of your firm relating to the procurement or performance of **any** construction contract, including actions to obtain payment brought by subcontractors, suppliers or others?	☐	☐
B. Have any criminal proceedings been brought or concluded adversely against your firm or a principal or officer of your firm relating to any of the following offenses: graft, embezzlement, forgery, bribery, falsification or destruction of records, receipt of stolen property or environmental offenses?	☐	☐
C. Have any judicial or administrative proceedings been brought or concluded adversely against your firm or a principal or officer of your firm relating to a violation of state or federal antitrust laws arising out of the submission of bids or proposals?	☐	☐
D. Have any judicial or administrative proceedings been brought or concluded adversely against your firm or a principal or officer of your firm relating to a violation of state or federal laws regulating campaign contributions?	☐	☐
E. Have any judicial or administrative proceedings been brought or concluded adversely against your firm or a principal or officer of your firm relating to a violation of chapter 268A of the Massachusetts General Laws?	☐	☐
F. Have any judicial or administrative proceedings been brought or concluded adversely against your firm or a principal or officer of your firm relating to a violation of any state or federal law regulating prevailing wages?	☐	☐
G. Have any judicial or administrative proceedings been brought or concluded adversely against your firm or a principal or officer of your firm relating to a violation of any state or federal law regulating hours of labor, minimum wages, overtime pay, equal pay, child labor or worker's compensation?	☐	☐
H. Have any judicial or administrative proceedings been brought or concluded adversely against your firm or a principal or officer of your firm relating to a violation of any state or federal law prohibiting discrimination in employment?	☐	☐
I. Have any judicial or administrative proceedings been brought or concluded adversely against your firm or a principal or officer of your firm relating to a claim of repeated or aggravated violation of any state or federal law regulating labor relations or occupational health or safety?	☐	☐
J. Have any proceedings been brought by any state or federal agency to debar or suspend your firm or any principal or officer of your firm from public contracting?	☐	☐
K. Has your firm been fined by OSHA or any other state or federal agency for violations of any laws or regulations related to occupational health or safety?	☐	☐

PART 5 - SUPERVISORY PERSONNEL

List all supervisory personnel, such as project managers and superintendents, who will be assigned to the project if your firm is awarded the contract. **Attach the resume of each person listed below**.

NAME	TITLE OR FUNCTION

PART 6 - CHANGES IN BUSINESS ORGANIZATION OR FINANCIAL CONDITION

Have there been any changes in your firm's business organization, financial condition or bonding capacity since the date your current Certificate of Eligibility was issued? ☐ Yes ☐ No
If YES, attach a separate page providing complete details.

END OF SECTION

CITY OF WORCESTER

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

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GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

ARTICLE 1 - GENERAL PROVISIONS

1.1 DEFINITIONS

1.1.1 THE CONTRACT DOCUMENTS

1.1.1.1 The Contract Documents consist of the Owner-Contractor Agreement, the Conditions of the Contract (General, Supplementary and other Conditions), Performance Bond, Payment Bond, Vote of Corporation, Instructions to Bidders, Bid Proposal, the Drawings, the Specifications, and all Addenda issued prior to and all Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a written interpretation issued by the Architect pursuant to Article 2, or (4) a written order for a minor change in the Work issued by the Architect pursuant to Article 12. The Contract Documents do not include Bidding Documents such as, sample forms, or portions of Addenda relating to any of these, or any other documents, unless specifically enumerated in the Owner-Contractor Agreement. The Drawings of this Contract shall be as listed on the cover sheet of the Drawings, as applicable. The Specifications of this Contract shall be listed on the Index to the Technical Specifications.

In the event of any conflict among the Contract Documents, the Documents shall be construed according to the following priorities: Highest Priority - Modifications, Second Priority- Agreement, Third Priority - Addenda-later date to take precedence, Fourth Priority - Special Requirements, Fifth Priority - Special Conditions, Sixth Priority - Supplementary General Conditions, Seventh Priority - General Conditions, Eighth Priority - Specifications, Ninth Priority - Drawings.

1.2 THE CONTRACT

1.2.1 The Contract Documents form the Contract for Construction. This Contract represents the entire and integrated agreement between the parties hereto and supersedes all prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification as defined in Article 1. These General Conditions, wherever applicable, shall be construed consistent with, and not to the exclusion of any terms of the Owner-Contractor Agreement, provided further however, that the terms of such Agreement shall take precedence, as provided in Article 1. Except for the special agreements in Article 4, nothing contained in the Contract Documents shall be construed to create any contractual relationship of any kind between the Architect and the Contractor. Nothing contained in the Contract Documents shall create any contractual relationship between the Owner or the Architect and any Subcontractor or Sub-subcontractor.

1.3 THE WORK

1.3.1 The Work comprises the completed construction required by the Contract Documents and includes all labor necessary to produce such construction, and all materials and equipment incorporated or to be incorporated in such construction.

1.4 THE PROJECT

1.4.1 The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part.

1.5 EXECUTION, CORRELATION AND INTENT

1.5.1 The Owner and Contractor shall sign the Contract Documents in duplicate.

1.5.2 By executing the Contract, the Contractor represents that he has visited the site, familiarized himself with the local conditions under which the Work is to be performed, and correlated his observations with the requirements of the Contract Documents.

1.5.3 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work. The Contract Documents are complementary, and what is required by any one shall be as binding as if required by all. Work not covered in the Contract Documents will not be required unless it is consistent therewith and is reasonably inferable therefrom as being necessary to produce the intended results. Words and abbreviations, which have well-known technical or trade meanings are used in the Contract Documents in accordance with such, recognized meanings. All work mentioned or indicated in the Contract Documents shall be performed by the Contractor as part of this Contract unless it is specifically indicated in the Contract Documents that such work is to be done by others. Should the drawings or the Specifications disagree in themselves or with each other, the Contractor shall provide the better quality or greater quantity of work and/or materials unless otherwise directed by written addendum to the Contract.

1.5.4 The organization of the Specifications into divisions, sections and articles, and the arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade. The Contractor and all Subcontractors shall refer to all of the Drawings, including those showing primarily the work of the mechanical, electrical and other specialized trades, and to all of the Sections of the Specifications, and shall perform all work reasonably inferable therefrom as being necessary to produce the indicated results.

1.5.5 All indications or notations which apply to one of a number of similar situations, materials or processes shall be deemed to apply to all such situations, materials or processes wherever they appear in the Work, except where a contrary result is clearly indicated by the Contract Documents.

1.5.6 Where codes, standards, requirements and publications of public and private bodies are referred to in the Specifications, references shall be understood to be to the latest revision prior to the date of receiving bids, except where otherwise indicated.

1.5.7 Where no explicit quality or standards for materials or workmanship are established for work, such work is to be of good quality for the intended use and consistent with the quality of the surrounding work and of the construction of the Project generally.

1.5.8 All manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with the manufacturer's written or printed directions and instructions unless otherwise indicated in the Contract Documents.

1.5.9 The Mechanical and Electrical Drawings are diagrammatic only, and are not intended to show the exact physical locations or configurations of work. Such work shall be installed to clear all obstructions, permit proper clearances for the work of other trades, and present an orderly appearance where exposed. Exact locations of fixtures and outlets shall be obtained from the Architect as provided in Article 4 before the work is roughed in; work installed without such information from the Architect shall be relocated at the Contractor's expense.

1.5.10 Except for work governed by M.G.L. c.149 §44F, the Owner and Architect assume no liability arising out of jurisdictional issues raised or claims advanced by trade organizations or other interested parties based on the arrangement or manner of subdivision of the content of the Plans and Specifications. The Contractor shall make all necessary arrangements to reconcile any such jurisdictional conflicts without delay, damage, or cost to the Owner, unless otherwise agreed to by the parties hereto.

1.6 OWNERSHIP AND USE OF DOCUMENTS

1.6.1 All Drawings and Specifications furnished by the Architect, and all copies thereof and the copyright therein, are the property of the Architect or the Owner. They are to be used only with respect to this Project and are not to be used on any other project. With the exception of one contract set for each party to the Contract, such documents are to be returned or suitably accounted for to the Architect on request at the completion of the Work. Submission or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Owner's common law copyright or other reserved rights.

ARTICLE 2 - ARCHITECT

2.1 DEFINITION

2.1.1 The Architect is the person lawfully licensed to practice Architecture, or an entity lawfully practicing architecture identified as such in the Owner-Contractor Agreement, and is referred to throughout the Contract Documents as if singular in number and masculine in gender. The term Architect means the Architect or his Authorized Representative.

2.2 ADMINISTRATION OF THE CONTRACT

2.2.1 The Architect will provide administration of the Contract as herein described and pursuant to the terms of the Design Services Agreement between the Architect and the Owner.

2.2.2 The Architect will be the Owner's representative during construction and until final payment is due. The Architect will advise and consult with the Owner. The Owner's instructions to the Contractor shall be forwarded through the Architect. The Architect will have the authority to act on behalf of the Owner only to the extent provided in the Contract Documents and the Design Services Agreement between the two, unless otherwise modified by written instrument in accordance with Article 2.

2.2.3 The Architect will visit the site at intervals appropriate to the stage of construction to familiarize himself generally with the progress and quality of the Work and to determine in general if the Work is proceeding in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. On the basis of his on-site observations as an Architect, he will keep the Owner informed of the progress of the Work, and will endeavor to guard the Owner against defects and deficiencies in the Work of the Contractor.

2.2.4 The Architect will not be responsible for, and will not have control or charge of, construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work, and he will not be responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents. The Architect will not be responsible for or have control or charge over the acts or omissions of the Contractor, Subcontractors, or any of their agents or employees, or any other persons performing any of the Work.

2.2.5 The Architect shall at all times have access to the Work wherever it is in preparation and progress. The Contractor shall provide facilities for such access so the Architect may perform his functions under the Contract Documents.

2.2.6 Based on the Architect's observations and an evaluation of the Contractor's Applications for Payment, the Architect will determine the amounts owing to the Contractor and will issue Certificates for Payment in such amounts, as provided in Article 9.

2.2.7 The Architect will be the interpreter of the requirements of the Contract Documents and the judge of the performance there under by both the Owner and Contractor.

2.2.8 The Architect will render interpretations necessary for the proper execution or progress of the Work, with reasonable promptness and in accordance with M.G.L. Chapter 30, Section 39P, or any lesser time limit agreed upon. Either party to the Contract may make written request to the Architect for such interpretations.

2.2.9 Claims, disputes and other matters in question between the Contractor and the Owner relating to the execution of progress of the Work or the interpretation of the Contract Documents shall be referred initially to the Architect for decision, which he will render in writing within a reasonable time.

2.2.10 All interpretations and decisions of the Architect shall be consistent with the intent of and reasonably inferable from the Contract Documents and will be in writing or in the form of drawings. In his capacity as interpreter and judge, he will endeavor to secure faithful performance by both the Owner and the Contractor, will not show partiality to either, and will not be liable for the result of any interpretation or decision rendered in good faith, and in the absence of negligence, in such capacity.

2.2.11 The Architect's decisions in matters relating to artistic effect will be final if consistent with the intent of the Contract Documents.

2.2.12 The Architect will have authority to reject Work, which does not conform to the Contract Documents. Whenever, in his opinion, he considers it necessary or advisable for the implementation of the intent of the Contract Documents, he will have authority to require special inspection or testing of the Work in accordance with Article 7, whether or not such Work be then fabricated, installed or completed. However, neither the Architect's authority to act under this Article 2 nor any decision made by him in good faith either to exercise or not to exercise such authority, shall give rise to any duty or responsibility of the Architect to the Contractor, any Subcontractor, any of their agents or employees, or any other person performing any of the Work.

2.2.13 The Architect will review and approve or take other appropriate action upon Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for conformance with the design concept of the Work and with the information given in the Contract Documents. Such action shall be taken with reasonable promptness so as to cause no delay. The Architect's approval of a special item shall not indicate approval of an assembly of which the item is a component.

2.2.14 The Architect will prepare Change Orders in accordance with Article 12, and will have authority to order minor changes in the Work as provided in Article 12.

2.2.15 The Architect will conduct inspections to determine the dates of Substantial Completion and final completion, will receive and forward to the Owner for the Owner's review written warranties and related documents required by the Contract and assembled by the Contractor, and will issue a final Certificate of Payment upon compliance with the requirements of Article 9.

2.2.16 In case of the termination of the employment of the Architect, the Owner shall appoint an Architect against whom the Contractor makes no reasonable objection whose status under the Contract Documents shall be that of former Architect.

ARTICLE 3 - OWNER

3.1 DEFINITION

3.1.1 The term Owner means the City of Worcester, acting by and through its city manager and such representatives as the city manager shall assign to the Project.

3.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

3.2.1 The Owner shall, at the request of the Contractor, at the time of execution of the Owner-Contractor Agreement, furnish to the Contractor reasonable evidence that he has made financial arrangements to fulfill his obligations under the Contract. Unless such reasonable evidence is furnished, the Contractor is not required to execute the Owner-Contractor Agreement or to commence the Work.

3.2.2 The Owner shall furnish existing surveys, if any, describing the physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site.

3.2.3 Except as provided in Article 4, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for the construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

3.2.4 The Owner shall furnish information or services under the Owner's control with reasonable promptness after receipt from the Contractor of a written request for such information or services.

3.2.5 Unless otherwise provided in the Contract Documents, the Contractor will be furnished, free of charge, all copies of available bid documents, Drawings, and Specifications. The Contractor may at any time order additional sets at the Contractor's expense.

3.2.6 The Owner shall forward all instructions to the Contractor through the Architect.

3.2.7 The foregoing are in addition to other duties and responsibilities of the Owner enumerated herein and especially those in respect to Work by Owner or by Separate Contractors, Payments and Completion, and Insurance in Articles 6, 9 and 11 respectively.

3.3 OWNER'S RIGHT TO STOP THE WORK

3.3.1 If the Contractor fails to correct defective Work as required by Article 13 or persistently fails to carry out the Work in accordance with the Contract Documents, the Owner, by a written order signed personally or by an agent specifically so empowered by the Owner in writing, may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of the Owner to stop the Work shall not give rise to any duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Article 6.

3.4 OWNER'S RIGHT TO CARRY OUT THE WORK

3.4.1 3.4.1 If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within ten (10) days after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to any other remedy he may have, make good such deficiencies. In such case an appropriate Change Order shall be issued deducting from the payments then or thereafter due the Contractor the cost of correcting such deficiencies, including compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and the amount charged to the Contractor are both subject to prior notice being given

to the Architect by the Owner. If the payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the Owner.

ARTICLE 4 - CONTRACTOR

4.1 DEFINITION

4.1.1 The Contractor is the person or entity identified as such in the Owner-Contractor Agreement and is referred to throughout the Contract Documents as if singular in number and masculine in gender. The term Contractor means the Contractor or his Authorized Representative.

4.2 REVIEW OF CONTRACT DOCUMENTS

4.2.1 Before starting the Work, and at frequent intervals during the progress thereof, the Contractor shall carefully study and compare the Agreement, Conditions of the Contract, Drawings, Specifications, Addenda and other Contract Documents and shall at once report to the Architect any error, inconsistency or omission he may discover. Any necessary change shall be ordered as provided in Article 12 and other provisions of the Contract Documents. If the Contractor proceeds with the Work without such notice to the Architect, having discovered such errors, inconsistencies or omissions, or if by reasonably study of the Contract Documents he could have discovered such, the Contractor shall bear all costs arising there from.

4.2.2 The Contractor shall give the Architect timely notice of any additional design drawings, specifications, or instructions required to define the Work in greater detail, or to permit the proper progress of the Work.

4.2.3 The Contractor shall not proceed with any Work not clearly and consistently defined in detail in the Contract Documents, but shall request additional drawings or instructions from the Architect as provided in Article 4. If the Contractor proceeds with such Work without obtaining further drawings or instructions, he shall correct Work incorrectly done at his own expense.

4.2.4 The Contractor may submit Requests For Information (RFI) to the Architect to help facilitate the Contractor's performance of the Contract. Prior to submitting each RFI, the Contractor shall first carefully study and compare the Contract Documents, field conditions, other Owner provided information, Contractor and Subcontractor prepared Coordination Drawings and prior Project correspondence and documentation to determine that the information to be requested is not reasonably obtainable from such sources after such careful study and comparison.

4.2.5 Each RFI shall be submitted by the Contractor to the Architect for determination. Each RFI shall be in writing, on such form and with such accompanying information as the Architect may require for such purpose. Each RFI shall identify a single item or topic and the specific sources which were reviewed by the Contractor in its efforts to determine the information requested, and a statement that the information being requested could not be determined from such sources.

4.2.6 The Contractor shall submit each RFI sufficiently in advance of the date by which such information is required in order to allow the Architect sufficient time, in the Architect's professional judgment, to permit adequate review and response and to permit Contractor compliance with the latest Construction Schedule.

4.2.7 The Contractor shall reimburse the Owner amounts charged to the Owner by the Architect for responding to excessive or unnecessary RFI's where such information is available to the Contractor from a careful study and comparison of the Contract Documents, field conditions, other Owner provided information, Contractor prepared Coordination Drawings, or project correspondence or documentation.

4.3 SUPERVISION AND CONSTRUCTION PROCEDURES

4.3.1 The Contractor shall supervise and direct the Work, using his best skill and attention. He shall be solely responsible for all construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract.

4.3.2 The Contractor shall be responsible to the Owner for the acts and omissions of his employees, Subcontractors and their agents and employees, and other persons performing any of the Work under a contract with the Contractor.

4.3.3 The Contractor shall not be relieved from his obligations to perform the Work in accordance with the Contract Documents either by the activities or duties of the Architect in his administration of the Contract, or by inspections, tests or approvals required or performed under Article 7 by persons other than the Contractor.

4.3.4 Where the Contract Documents refer to particular construction means, methods, techniques, sequences or procedures or indicate or imply that such are to be used in the Work, such mention is intended only to indicate that the operations of the Contractor shall be as to produce at least the quality of work implied by the operations described, but the actual determination of whether or not the described operations may be safely and suitably employed on the Work shall be the responsibility of the Contractor, who shall notify the Architect in writing of the actual means, methods, techniques, sequences or procedures which will be employed on the Work, if these differ from those mentioned in the Contract Documents. All loss, damage, or liability, or cost of correcting defective work arising from the employment of any construction means, methods, techniques, sequences or procedures shall be borne by the Contractor, notwithstanding that such construction means, methods, techniques, sequences or procedures are referred to, indicated or implied by the Contract Documents, unless the Contractor has given timely notice to the Architect in writing that such means, methods, techniques, sequences or procedures are not safe or suitable, and the Contractor has then been instructed in writing by the Owner to proceed at the Owner's risk.

4.4 LABOR AND MATERIALS

4.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for all labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for the proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work. The word 'provide' shall mean furnish and install complete, including connections, unless otherwise specified.

4.4.2 The Contractor shall at all times enforce strict discipline and good order among his employees and shall not employ on the Work any unfit person or anyone not skilled in the task assigned to him.

4.4.3 The Contractor shall procure its materials from such sources and employ labor subject to contract terms and conditions so as to ensure harmonious labor relations on the site and prevent strikes or labor disputes. The Contractor, in the event of a labor dispute including strikes, shall take the necessary and appropriate action required at no expense to the Owner to prevent the disruption of the Work.

WARRANTY

4.4.4 The Contractor warrants to the Owner and the Architect that all materials and equipment furnished under this Contract will be new and of recent manufacture unless otherwise specified, and that all Work will be of good quality, free from faults and defects and in conformance with the Contract Documents. All Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective.

4.4.5 The Contractor shall be responsible for determining that all materials furnished for the Work meet all requirements of the Contract Documents. The Architect may require the Contractor to produce reasonable evidence that a material meets such requirements, such as certified reports of past tests by qualified testing laboratories, reports of studies by qualified experts, or other evidence which, in the opinion of the Architect, would lead to a reasonable certainty that any material used, or proposed to be used, in the Work meets the requirements of the Contract Documents. All such data shall be furnished at the Contractor's expense. This provision shall not require the Contractor to pay for periodic testing of different batches of the same material, unless such testing is specifically required by the Contract Documents to be performed at the Contractor's expense.

4.4.6 If the Contractor proposed to use a material which, while suitable for the intended use, deviates in any way from the detailed requirements of the Contract Documents, he shall inform the Architect in writing of the nature of such deviations at the time the material is submitted for approval, and shall request written approval of the deviation from the requirements of the Contract Documents.

4.4.7 In requesting approval of the deviations or substitutions, the Contractor shall provide, upon request, evidence leading to a reasonable certainty that the proposed substitution or deviation will provide a quality of result at least equal to that otherwise attainable. If, in the opinion of the Architect, the evidence presented by the Contractor does not provide a sufficient basis for such reasonable certainty, the Architect may reject such substitution or deviation without further investigation.

4.4.8 The Contract Documents are intended to produce a building of consistent character and quality of design. All components of the building including visible items of mechanical and electrical equipment have been selected to have a coordinated design in relation to the overall appearance of the building. The Architect shall judge the design and appearance of proposed substitutes on the basis of their suitability in relation to the overall design of the project, as well as for their intrinsic merits. The Architect will not approve as equal to materials specified proposed substitutes, which, in his opinion, would be out of character, obtrusive, or otherwise inconsistent with the character or quality of design of the project. In order to permit coordinated design of color and finishes the Contractor shall, if required by the Architect, furnish the substituted material in any color, finish, texture, or pattern which would have been available from the manufacturer originally specified, at no additional cost to the Owner.

4.4.9 Any additional cost, or any loss or damage arising from the substitution of any material or any method for those originally specified shall be borne by the Contractor, notwithstanding approval or acceptance of such substitution by the Owner or the Architect, unless such substitution was made at the written request or direction of the Owner.

4.4.10 The warranty provided in this Article 4 shall be in addition to and not in limitation of any other warranty required by the Contract Documents or otherwise prescribed by law.

4.4.11 The Contractor shall procure and deliver to the Architect, no later than the date claimed by the Contractor as the date of Substantial Completion, all special warranties required by the Contract Documents. Delivery by the Contractor shall constitute the Contractor's guarantee to the Owner that the warranty will be performed in accordance with its terms and conditions.

4.4.12 The Contractor shall guarantee all Work for a period of a minimum of one year (unless otherwise required in the specifications to have a longer warranty time) after Date of Substantial Completion or by the terms of any special warranty required by the Contract Documents. The Contractor shall, upon written notice from the Architect, promptly correct defective Work or Work not in accordance with the Contract Documents.

4.5 TAXES

4.5.1 The Contractor shall pay all sales, consumer, use and other similar taxes for the Work or portions thereof provided by the Contractor which are legally enacted at the time bids are received, whether or not yet effective.

4.5.2 IMPORTANT TAX NOTE: This project, being constructed for a political subdivision of the Commonwealth of Massachusetts, is exempt from certain taxes. It is therefore required that the Contractor and all Subcontractors purchasing taxable goods covered by the governing tax codes make known to suppliers the tax-exempt status of the institution in order that such taxes will not appear in the Contract Sum. The Owner will provide the necessary evidence and certificates of its tax exemption upon request of those concerned. The most applicable taxes concerned are:

(1) Federal Excise Taxes as applied to articles, which are taxable under Chapter 12 of the Internal Revenue Code of l954, as amended.
(2) Commonwealth of Massachusetts Sales Tax.

(3) Tax Exempt Number: 046-001-418.

4.6 PERMITS, FEES AND NOTICES

4.6.1 The Contractor and all subcontractors shall secure, coordinate and pay for the building permit and for all other permits and governmental fees, licenses and inspections necessary for the proper execution and completion of the Work.

4.6.2 The Contractor shall give all notices and comply with all laws, ordinances, rules, regulations, and lawful orders of any public authority bearing on the performance of the Work.

4.6.3 It is not the responsibility of the Contractor to make certain the Contract Documents are in accordance with the applicable laws, statutes, building codes and regulations. If the Contractor observes that any of the Contract Documents are at variance therewith in any respect, he shall promptly notify the Architect in writing, and any necessary changes shall be accomplished by appropriate Modification.

4.6.4 If the Contractor performs any Work knowing it to be contrary to such laws, ordinances, rules and regulations, and without such notice to the Architect, he shall assume full responsibility therefore and shall bear all costs attributable thereto.

4.7 ALLOWANCES

4.7.1 Note that the use of such Allowances are prohibited in any contract or work subject to the provisions of M.G.L. c. 149, §44A.

4.8 PROJECT MANAGEMENT

4.8.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site full time daily including work performed outside normal working hours during the progress of the Work until the date of substantial completion, and for such additional time thereafter as the Architect may determine to be necessary for the expeditious completion of the Work. Only under extenuating circumstances, and with approval of the Architect and Owner, will the Contractor be allowed to substitute superintendents prior to the date of Substantial Completion. The superintendent shall represent the Contractor and all communications given to the superintendent shall be as binding as if given to the Contractor. Important communications shall be confirmed in writing. Other communications shall be so confirmed on written request in each case.

4.8.2 The Contractor shall retain a competent Registered Professional Engineer or Registered Land Surveyor, acceptable to the Architect and Owner who shall establish the exterior lines and required elevations of all buildings and structures to be erected on the site and shall establish sufficient lines and grades for the construction of associated work such as, but not limited to, roads, utilities and site grading. The Engineer or Land Surveyor shall certify as to the actual location of the constructed facilities in relation to property lines, building lines, easements, and other restrictive boundaries.

4.8.3 The Contractor shall attend job meetings with the Architect and such other persons as the Architect may from time to time wish to have present. The Contractor shall be represented by a principal, project manager, general superintendent or other authorized main office representative, as well as by the Contractor's own superintendent. An authorized representative of any Subcontractor or Sub-subcontractor shall attend such meetings, if the representative's presence is requested by the Architect. Such representatives shall be empowered to make binding commitments on all matters to be discussed at such meetings including costs, payments, change orders, time schedules and manpower. Any notices required under the Contract may be serviced on such representatives. Refer to specification section 01200 Project Meetings for additional requirements.

4.8.4 The Contractor shall establish the building grades, lines, levels, column, wall, and partition lines required by the various subcontractors in laying out their work.

4.8.5 The Contractor shall coordinate and supervise the work performed by Subcontractors to the end that the work is carried out without conflict between trades and so that no trade at any time causes delay to the general progress of the Work. The Contractor and all Subcontractors shall at all times afford each trade, any separate contractor, or the Owner, every reasonable opportunity for the installation of work and the storage of materials.

4.9 PROGRESS SCHEDULE

4.9.1 The Contractor shall prepare and submit to the Architect a progress schedule as described in Article 8.

4.10 DOCUMENTS AND SAMPLES AT THE SITE

4.10.1 The Contractor shall maintain at the site for the Owner a record copy of all Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to record all changes made during construction, and approved Shop Drawings, Product Data and Samples. These shall be available to the Architect and shall be delivered to him for the Owner upon completion of the Work.

4.10.2 Refer to Specifications Section 017700 entitled PROJECT CLOSEOUT, for additional requirements for Record Drawings and Operating and Maintenance Manuals.

4.11 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

4.11.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor, or any Subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

4.11.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate a material, product or system for some portion of the Work.

4.11.3 Samples are physical examples, which illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

4.11.4 The Contractor shall review, approve and submit, with reasonable promptness and in such sequence as to cause no delay in the Work or in the work of the Owner or any separate contractor, all Shop Drawings, Product Data and Samples required by the Contract Documents.

4.11.5 By approving and submitting Shop Drawings, Product Data, and, Samples, the Contractor thereby represents that he has determined and verified all dimensions, quantities, field dimensions, relations to existing work, coordination with work to be installed later, coordination with information on previously accepted Shop Drawings, Product Data, or Samples and verification of compliance with all the requirements of the Contract Documents. The accuracy of all such information is the responsibility of the Contractor. In reviewing Shop Drawings, Product Data, and Samples, the Architect shall be entitled to rely upon the Contractor's representation that such information is correct and accurate.

4.11.6 The Contractor shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data or Samples under Article 2 unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submission and the Architect has given written approval to the specific deviation. The Contractor shall not be relieved from responsibility for errors or omissions in the Shop Drawings, Product Data or Samples by the Architect's approval thereof.

4.11.7 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data or Samples, to revisions other than those requested by the Architect on previous submittals. Unless such written notice has been given, the Architect's approval of a resubmitted Shop Drawing, Product Data, or Sample shall not constitute approval of any changes not requested on the prior submittal.

4.11.8 No portion of the Work requiring submission of a Shop Drawing, Product Data or Sample shall be commenced until the submittal has been approved by the Architect as provided in Article 2. All such portions of the Work shall be in accordance with approved submittals.

4.11.9 Refer to Specifications Section 013300, SUBMITTALS, for additional requirements.

4.12 USE OF SITE

4.12.1 The right of possession of the premises and the improvements made thereon by the Contractor shall remain at all times in the Owner. The Contractor's right of entry and use thereof arises solely from the permission granted by the Owner under the Contract Documents. The Contractor shall confine their apparatus; the storage of materials and the operations of his workmen to limits indicated by law, ordinances, the Contract Documents and permits and/or directions by the Architect and shall not unreasonably encumber the premises with his materials.

4.13 CUTTING AND PATCHING WORK

4.13.1 The Contractor shall be responsible for all cutting, fitting or patching that may be required to complete the Work or to make its several parts fit together properly.

4.13.2 The Contractor shall not damage or endanger any portion of the Work or the work of the Owner or any separate contractors by cutting, patching or otherwise altering any work, or by excavation. The Contractor shall not cut or otherwise alter the work of the Owner or any separate contractor except with the written consent of the Owner and of such separate contractor. The Contractor shall not unreasonably withhold from the Owner or any separate contractor his consent to cutting or otherwise altering the Work.

4.14 CLEANING UP

4.14.1 The Contractor at all times shall keep the premises free from accumulation of waste materials or rubbish caused by his operations. At the completion of the Work he shall remove all his waste materials and rubbish from and about the Project as well as all his tools, construction equipment, machinery and surplus materials. Immediately prior to the Architect's inspection for Substantial Completion, the Contractor shall completely clean the premises.

4.14.2 If the Contractor fails to maintain a clean site, free of accumulation of waste, rubbish and materials, the Owner may do so after twenty-four hour notification in accordance with Article 3 and the cost there of shall be charged to the Contractor.

4.14.3 If the Contractor fails to clean up at the completion of the Work, the Owner may do so as provided in Article 3 and the cost thereof shall be charged to the Contractor. Refer to Specifications Section 017000, PROJECT CLOSEOUT, for additional requirements.

4.15 COMMUNICATIONS

4.15.1 The Contractor shall forward all communications to the Owner through the Architect. Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall communicate through the Architect. Communications by and with the Architect’s consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with other Owner’s contractors shall be through the Architect.

4.16 ROYALTIES AND PATENTS

4.16.1 The Contractor shall pay all royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and shall save the Owner harmless from loss on account thereof, except that the Architect shall be responsible for all such loss when a particular design, process or the product of a particular manufacturer or manufacturers is specified, but if the Contractor has reason to believe that the design, process or product specified is an infringement of a patent, he shall be responsible for such loss unless he promptly gives such information to the Architect.

4.17 INDEMNIFICATION

4.17.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Architect and their agents and employees from and against all claims, damages, losses and expenses, including but not limited to attorney's fees, arising out of; or resulting from the performance of the Work, provided that any such claim, damage, loss or expense (1) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including the loss of use resulting there from and (2) is caused in whole or in part by any negligent act or omission of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right or obligation of indemnity, which would otherwise exist as to any party or person, described in this Article 4.

4.17.2 In any and all claims against the Architect or any of his agents or employees, by any employee of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under this Article 4 shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any Subcontractor under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts.

4.17.3 The obligations of the Contractor under this Article 4 shall not extend to the liability of the Architect, his agents or employees, arising out of (1) the preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs or specifications, or (2) the giving of or the failure to give directions or instructions by the Architect, his agents or employees provided, such giving or failure to give is the primary cause of the injury or damage.

ARTICLE 5 - SUBCONTRACTOR

5.1 DEFINITION

5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform any of the Work at the site and as further defined by M.G.L. Chapter 30, Section 39F(3). The term Subcontractor is referred to throughout the Contract Documents as if singular in number and masculine in gender and means a Subcontractor or his authorized representative. The term Subcontractor does not include any separate contractor or his subcontractors.

5.1.2 A Sub-subcontractor is a person or entity that has a direct or indirect contact with a Subcontractor to perform any of the Work at the site. The term Sub-subcontractor is referred to throughout the Contract Documents as if singular in number and masculine in gender and means a Sub-subcontractor or an authorized representative thereof.

5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

5.2.1 Unless otherwise required by the Contract Documents or the Bidding Documents, the Contractor, as soon as practicable after the award of the Contract, shall furnish to the Owner and the Architect, in writing, the names of the persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each of the principal portions of the Work. The Architect will promptly reply to the Contractor in writing stating whether or not the Owner or the Architect, after due investigation, has reasonable objection to any such proposed person or entity. Failure of the Owner or Architect to reply promptly shall constitute notice of no reasonable objection.

5.2.2 The Contractor shall not contract with any such proposed person or entity to which the Owner or the Architect has made reasonable objection under the provisions of Article 5. The Contractor shall not be required to contract with anyone to whom he has a reasonable objection.

5.2.3 If the Owner or the Architect has reasonable objection to any such proposed person or entity, the Contractor shall submit a substitute to whom the Owner or the Architect has no reasonable objection, and the Contract Sum shall be increased or decreased by the difference in cost occasioned by such substitution and an appropriate Change Order shall be issued; however, no increase in the Contract Sum shall be allowed for any such substitution unless the Contractor has acted promptly and responsively in submitting names as required by Article 5.

5.2.4 The Contractor shall make no substitution for any Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

5.3 SUBCONTRACTUAL RELATIONS

5.3.1 By an appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by the terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities which the Contractor, by these Documents, assumes toward the Owner and the Architect. Said agreement shall preserve and protect the rights of the Owner and the Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that the subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the Contractor-Subcontractor agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by these Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with his Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the Subcontract, copies of the Contract Documents to which the Subcontractor will be bound by this Article 5, and identify to the Subcontractor any terms and conditions of the proposed Subcontract which may be at variance with the Contract Documents. Each Subcontractor shall similarly make copies of such Documents available to his Sub-subcontractors.

ARTICLE 6 - WORK BY OWNER OR BY SEPARATE CONTRACTORS

6.1 OWNER'S RIGHT TO PERFORM WORK AND TO AWARD SEPARATE CONTRACTS

6.1.1 The Owner reserves the right to perform work related to the Project with his own forces, and to award separate contracts in connection with other portions of the Project or other work on the site under these or similar Conditions of the Contract. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, he shall make such claim as provided elsewhere in the Contract Documents.

6.1.2 When separate contracts are awarded for different portions of the Project or other work on the site, the term Contractor in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

6.1.3 The Owner will provide for the coordination of the work of his own forces and of each separate contractor with the Work of the Contractor, who shall cooperate therewith as provided in Article 6.

6.1.4 The General Contractor shall permit the Owner to place and install as much equipment during the progress of the work as is possible before the completion of the various parts of the work, and agrees that such placing and the installation of equipment shall not in any way evidence the completion of the work or any portion of it, nor shall it signify the Owner's completion of the work or any portion thereof.

6.2 MUTUAL RESPONSIBILITY

6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for the introduction and storage of their materials and equipment and the execution of their work, and shall connect and coordinate his Work with theirs as required by the Contract Documents.

6.2.2 If any part of the Contractor's Work depends for proper execution or results upon the work of the Owner or any separate contractor, the Contractor shall, prior to proceeding with the Work, promptly report to the Architect any apparent discrepancies or defects in such other work that render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acceptance of the Owner's or separate contractors' work as fit and proper to receive his Work, except as to defects, which may subsequently become apparent in such work by others.

6.2.3 Any costs caused by defective or ill-timed work shall be borne by the party responsible therefore.

6.2.4 Should the Contractor wrongfully cause damage to the work or property of the Owner, or to other work on the site, the Contractor shall promptly remedy such damages as provided in Article 10.

6.2.5 Should the Contractor wrongfully cause damage to the work or property of any separate contractor, the Contractor shall upon due notice promptly attempt to settle with such other contractor by agreement, or otherwise to resolve the dispute. If such separate contractor sues the Owner on account of any damage alleged to have been caused by the Contractor, the Owner shall notify the Contractor.

6.3 OWNER'S RIGHT TO CLEAN UP

6.3.1 If a dispute arises between the Contractor and separate contractors as to their responsibility for cleaning up as required by Article 4, the Owner may clean up and charge the cost thereof to the contractors responsible therefore as the Architect shall determine to be just.

ARTICLE 7 - MISCELLANEOUS PROVISIONS

7.1 GOVERNING LAW

7.1.1 The law of the Commonwealth of Massachusetts shall govern the Contract.

7.2 SUCCESSORS AND ASSIGNS

7.2.1 The Owner and the Contractor each binds himself, his partners, successors, assigns and legal representatives to the other party hereto and to the partners, successors, assigns and legal representatives of such other party with respect to all covenants, agreements, and obligations contained in the Contract Documents. Neither party to the Contract shall assign the Contract or sublet it as a whole without the written consent of the other, nor shall the Contractor assign any moneys due or to become due to him hereunder, without the previous written consent of the Owner.

7.2.2 If, after making final payment, the Owner conveys to a third party any building or other improvement constructed under the Contract, any rights with respect to the property so conveyed which the Owner may have against the Contractor under Article 13 or by virtue of claims which, under the terms of Article 9, are reserved to the Owner after the making and acceptance of final payment, shall automatically transfer to such third party.

7.3 WRITTEN NOTICE

7.3.1 Written notice shall be deemed to have been duly served if delivered in person to an authorized representative of the person or entity for whom it was intended, or if delivered at or sent by registered or certified mail to the address of such person or entity set forth in the Agreement or in a subsequent written notice or by other means as specified in the Contract Documents.

7.4 CONSENT OR WAIVER

7.4.1 No consent or waiver, express or implied, by the Owner or the Architect to, or of, any breach of any covenant, condition or duty of the Contractor shall be construed as a consent to or waiver of any other breach of the same or any other covenant, condition or duty.

7.5 PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND

7.5.1 The Owner shall have the right to require the Contractor to furnish bonds covering the faithful performance of the Contract and the payment of all obligations arising there under if and as required in the Bidding Documents or in the Contract Documents.

7.6 RIGHTS AND REMEDIES

7.6.1 The duties and obligations imposed by the Contract Documents and the rights and remedies available there under shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law.

7.7 TESTS

7.7.1 If the Contract Documents, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any portion of the Work to be inspected, tested or approved, the Contractor shall give the Architect timely notice of its readiness so the Architect may observe such inspection, testing or approval. The Contractor shall bear all costs of such inspections, tests or approvals conducted by public authorities. Unless otherwise provided, the Owner shall bear all costs of other inspections, tests or approvals.

7.7.2 If the Architect determines that any Work requires special inspection, testing, or approval which Article 7 does not include, he will, upon written authorization from the Owner, instruct the Contractor to order such special inspection, testing or approval, and the Contractor shall give notice as provided in Article 7. If such special inspection or testing reveals a failure of the Work to comply with the requirements of the Contract Documents, the Contractor shall bear all costs thereof, including compensation for the Architect's additional services made necessary by such failure, otherwise the Owner shall bear such costs, and an appropriate Change Order shall be issued.

7.7.3 The Contractor shall obtain and deliver promptly to the Architect any occupancy permit or any certificates of final inspection of any part of his work or operating permits for any mechanical apparatus, such as elevators, escalators, boilers, air compressors, etc., which may be required by law to permit full use and occupancy of the premises by the Owner. Receipt of such permits or certificates by the Architect shall be a condition precedent to Substantial Completion of the Work.

ARTICLE 8 - TIME

8.1 DEFINITIONS

8.1.1 Unless otherwise provided, the Contract Time is the period of time allotted in the Contract Documents for Substantial Completion of the Work as defined in Article 8, including authorized adjustments thereto.

8.1.2 The Date of Commencement of the Work is the date of the execution of the Owner-Contractor Agreement. The Contractor shall not commence Work on the site until the Architect issues a Notice to Proceed.

8.1.3 The Date of Substantial Completion of the Work or designated portion thereof is the date certified by the Architect when construction is sufficiently complete, in accordance with the Contract Documents, so the Owner can occupy or utilize the Work or designated portion thereof for the use for which it is intended and only minor items which can be corrected or completed without substantial interference with the Owner's use of the Work remain to be corrected or completed. The Date of Substantial Completion shall be on or after the date of issuance of a Certificate of

Occupancy as defined in 780 CMR for the Work without reservations or conditions by the Building Official.

8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically designated.

8.1.5 The term "working day" shall mean any calendar day except Saturdays, Sundays, and legal holidays at the place of the building.

8.2 PROGRESS AND COMPLETION

8.2.1 All time limits stated in the Contract Documents are of the essence to the Contract.

8.2.2 The Contractor shall begin the Work on the date of commencement as defined in Article 8. He shall carry the Work forward expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

8.2.3 Within two (2) weeks after award of the Contract, the Contractor shall submit to the Architect a Progress Schedule showing for each class of work included in the Schedule of Values, the percentage completion to be obtained and the total dollar value of work to be completed as of the first of each month until Substantial Completion. All calculations shall be on the basis of work in place, but not including the value of materials delivered but not in place.

8.2.4 The Progress Schedule shall be based on an orderly progression of the Work, allowing adequate time for each operation, and leading to a reasonable certainty of Substantial Completion by the date established in the Agreement. The Progress Schedule will be reviewed by the Architect for compliance with the requirements of this Article and will be accepted by him or returned to the Contractor for revision and resubmittal. Unless specifically required by law, no payment under this Contract shall be due until the Progress Schedule has been approved by the Architect.

8.2.5 If in any Application for Payment the total value of the completed Work in place, as certified by the Architect, is less than 90% of the total value of the Work in place estimated in the Progress Schedule, the Owner may, at his option, require the Contractor to accelerate the progress of the Work without cost to the Owner by increasing the work force or hours of work, or by other reasonable means approved by the Architect.

8.2.6 If each of three (3) successive applications, as certified by the Architect, indicate that the actual work completed is less than 90% of the values estimated in the Progress Schedule to be completed by the respective dates, the Owner may at his option, treat the Contractor's delinquency as a default justifying the action permitted under Article 13 of the document entitled CONTRACT, included elsewhere in the Contract Documents.

8.2.7 If the Architect has determined that the Contractor should be permitted to extend the time for completion, as provided in Paragraph 8.3, the calendar dates in the Progress Schedule shall be adjusted accordingly to retain their same relationship to the adjusted Date of Substantial Completion, and the dollar value of work to be completed as of the first of each month shall be adjusted pro-rata.

8.2.8 If the Contractor fails to submit any Application for Payment in any month, the Architect shall, for the purpose of this evaluation of progress, certify separately to the actual value of the work in place and completed as of the first of the month, to the best of his knowledge.

8.2.9 Nothing herein shall limit the Owner's right to liquidated or other damages for delays by the Contractor or to any other remedy which he may possess under other provisions of the Contract Documents or by law.

8.3 DELAYS AND EXTENSIONS OF TIME

8.3.1 Any delay and subsequent request for an extension of time shall be governed by M.G.L. Chapter 30, Section 39(O) and the Owner-Contractor Agreement.

8.3.2 No work shall be suspended without the written permission of the Owner or his representative.

8.3.3 If no agreement is made stating the dates upon which interpretations as provided in Article 2 shall be furnished, then no claim for delay shall be allowed on account of failure to furnish such interpretations until thirty (30) days after written request is made for them, and not unless such claim is reasonable.

8.3.4 This Article 8 does not exclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 - PAYMENTS AND COMPLETION

9.1 CONTRACT SUM

9.1.1 The Contract Sum is stated in the Owner-Contractor Agreement and, including authorized adjustments thereto, is the total amount payable by the Owner to the Contractor for the performance of the Work under the Contract Documents.

9.2 SCHEDULE OF VALUES

9.2.1 Before the first Application for Payment, the Contractor shall submit to the Architect a Schedule of Values allocated to the various portions of the Work, prepared in such form and supported by such data to substantiate its accuracy as the Architect may require and shall be revised if later found by the Architect to be inaccurate. This schedule, unless object to by the Architect, shall be used only as a basis for the Contractor's Application for Payment.

9.3 APPLICATIONS FOR PAYMENT

9.3.1 In accordance with Section 012900 of the Specifications, the Contractor shall submit to the Architect an itemized Application for Payment, notarized and supported by such data substantiating the Contractor's right to payment as the Owner or the Architect may require, and reflecting retainage, if any, as provided in Supplemental General Conditions, Article I. The format and number of copies of such Applications for Payment shall be as noted in Section 012900.

9.3.2 Unless otherwise provided in the Contract Documents, payments will be made on account of materials or equipment not incorporated in the Work but delivered and suitably stored at the site and, if approved in advance by the Owner, payments may similarly be made for materials or equipment suitably stored at some other location agreed upon in writing. Payments for materials or equipment stored on or off the site shall be conditioned upon submission by the Contractor of bills of sale or such other procedures satisfactory to the Owner to establish the Owner's title to such materials or equipment or otherwise protect the Owner's interest, including applicable insurance and transportation to the site for those materials and equipment stored off the site. The Contractor shall reimburse the Owner for any loss or damage to such unincorporated materials or equipment not covered by insurance.

9.3.3 The Contractor warrants that title to all Work, materials and equipment covered by an Application for Payment will pass to the Owner either by incorporation in the construction or upon the receipt of payment by the Contractor, whichever occurs first, free and clear of all liens, claims, security interests or encumbrances, hereinafter referred to in this Article 9 as "liens". The Contractor further agrees that the submission of any Application for Payment shall conclusively be deemed to waive all liens with respect to said work, materials and labor to which the Contractor then may be entitled; provided, however, that in no event shall such waiver of lien rights waive right to payment for said Work, materials and labor.

9.3.4 Each Application for Payment or periodic estimate requesting payment must be accompanied by a certificate from each Subcontractor stating that he has been paid all amounts due him on the basis of the previous periodic payment to the Contractor, or else stating the amount not so paid and the reason for the discrepancy. In the event, of any such discrepancy, the Contractor shall be required to furnish his own written explanation. See Section 01027.

9.4 CERTIFICATES FOR PAYMENT

9.4.1 The Architect will, within seven (7) days after the receipt of the Contractor's Application for Payment, either issue a Certificate for Payment to the Owner, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor in writing his reasons for withholding a Certificate as provided in Article 9.

9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on his observations at the site as provided in Article 2 and the data comprising the Application for Payment, that the Work has progressed to the point indicated; that, to the best of his knowledge, information and belief, the quality of the Work is in accordance with the Contract Documents (subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to the results of any subsequent tests required by or performed under the Contract Documents, to minor deviations from the Contract Documents correctable prior to completion, and to any specific qualifications stated in his Certificate); and that the Contractor is entitled to payment in the amount certified. However, by certifying a Certificate for Payment, the Architect shall not thereby be deemed to represent that he has made exhaustive or continuous on-site inspections to check the quality or quantity of the Work or that he has reviewed the construction means, methods, techniques, sequences or procedures, or that he has made any examination to ascertain how or for what purpose the Contractor has used the moneys previously paid on account of the Contract.

9.5 PROGRESS PAYMENTS

9.5.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents. The Owner retains the right to modify the amount of payment certified by the Architect. Reasons for modification shall be described in writing to the Architect and Contractor.

9.5.2 The Contractor shall promptly pay each Subcontractor upon receipt of payment from the Owner, out of the amount paid to the Contractor on account of such Subcontractor's Work, the amount to which said Subcontractor is entitled, reflecting the percentage actually retained, if any, from payments to the Contractor on account of such Subcontractor's Work. The Contractor shall, by an appropriate agreement with each Subcontractor, require each Subcontractor to make payments to his Sub-subcontractors in similar manner.

9.5.3 The Architect may, on request and at his discretion, furnish to any Subcontractor, if practicable, information regarding the percentages of completion or the amounts applied for by the Contractor and the action taken thereon by the Architect on account of Work done by such Subcontractor.

9.5.4 Neither the Owner nor the Architect shall have any obligation to pay or to see the payment of any moneys to any Subcontractor except as may otherwise be required by law.

9.5.5 No Certificate for a progress payment, nor any progress payment, nor any partial or entire use or occupancy of the Project by the Owner, shall constitute an acceptance of any Work not in accordance with the Contract Documents.

9.6 PAYMENTS WITHHELD

9.6.1 The Architect may decline to certify payment and may withhold his Certificate in whole or in part, to the extent reasonably necessary to protect the Owner, if in his opinion he is unable to make representations to the Owner as provided in Article 9. If the Architect is unable to make representations to the Owner as provided in Article 9 and to certify payment in the amount of the Application, he will notify the contractor as provided in Article 9. If the Contractor and the Architect cannot agree on a revised amount, the Architect will promptly certify a Certificate for Payment for the amount for which he is able to make such representations to the Owner. The Architect may also decline to certify payment or because of subsequently discovered evidence or subsequent observations, he may nullify the whole or any part of any Certificate for Payment previously issued, to such extent as may be necessary in his opinion to protect the Owner from loss because of:

(1) Defective Work not remedied,
(2) Third party claims filed or reasonable evidence indicating probable filing of such claims,
(3) Failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment,
(4) Reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum,
(5) Damage to the Owner,
(6) Reasonable evidence that the Work will not be completed within the Contract Time or

(7) Persistent failure to carry out the Work in accordance with the Contract Documents, or
(8) Failure of mechanical trades or electrical trades subcontractors to comply with mandatory requirements for maintaining record drawings. The Contractor shall be required to check record drawings each month. The Architect shall require written confirmation that the record drawings are "up-to-date" before approval of the Contractor's monthly payment requisition will be considered.

9.6.2 When the above grounds in Article 9 are removed, payment shall be made for amounts withheld because of them.

9.7 FAILURE OF PAYMENT

9.7.1 If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven (7) days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor as required by the Contract Documents any amount certified by the Architect, then the Contractor may, upon seven (7) additional days written notice to the Owner and the Architect, stop the Work until payment of the amount owing has been received.

9.8 SUBSTANTIAL COMPLETION

9.8.1 When the Contractor considers that the Work, or a portion thereof designated in the Contract Documents for separate completion, is substantially complete as defined in Article 8, the Contractor shall submit to the Architect (1) a list of items to be completed or corrected, and (2) all special warranties required by the Contract Documents endorsed by the Contractor and in a form reasonably acceptable to the Architect. The failure to include any items on the list mentioned in the preceding sentence does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. When the Architect on the basis of an inspection determines that the Work or designed portion thereof is substantially complete, and when the Contractor has submitted to the Architect the special warranties, as provided in the first sentence of this subparagraph, the Architect will then certify a Certificate of Substantial Completion which shall establish the Date of Substantial Completion, shall state the responsibilities of the Owner and the Contractor for security, maintenance, heat, utilities, damage to the Work, and insurance, and shall fix the time within which the Contractor shall complete the items listed therein. Warranties required by the Contract Documents shall commence on the Date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion. The Certificate of Substantial Completion shall be submitted to the Owner and the Contractor for their written acceptance of the responsibilities assigned to them in such Certificate.

9.8.2 Upon Substantial Completion of the Work or designated portion thereof and upon application by the Contractor and certification by the Architect, the Owner shall make payment, reflecting adjustment in retainage, if any, for such Work or portion thereof, as provided in the Contract Documents.

9.9 FINAL COMPLETION AND FINAL PAYMENT

9.9.1 Upon receipt of written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when he finds the Work acceptable under the Contract Documents and the Contract fully performed, he will promptly certify a final Certificate of Payment stating that to the best of his knowledge, information and belief, and on the basis of his observations and inspections, the Work has been completed in accordance with the terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor, and noted in said final Certificate, is due and payable. The Architect's final Certificate for Payment will constitute a further representation that the conditions precedent to the Contractor's being entitled to final payment as set forth in Article 9 have been fulfilled.

9.9.2 Unless otherwise required by applicable law, neither the final payment nor the remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or his property might in any way be responsible, have been paid or otherwise satisfied, (2) consent of surety, if any, to final payment and (3), if required by the Owner, other data establishing payment or satisfaction of all such obligations, such as receipts, releases and waivers of liens, arising out of the Contract, to the extent and in such form as may be designated by the Owner. If the Contractor fails to furnish such releases or waivers as the Owner reasonably requires satisfying the Owner that there are not outstanding claims, the Owner may require the Contractor, as a condition of final payment, to furnish a bond satisfactory to the Owner to indemnify the Owner against any such claims.

9.9.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by the issuance of Change Orders affecting final completion, and the Architect so confirms, the Owners shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than the retainage stipulated in the Contract Documents, and if bonds have been furnished as provided in Article 7, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

9.9.4 The making of final payment shall constitute a waiver of all claims by the Owner except those arising from: (1) unsettled claims under the Bonds required elsewhere in the Contract Documents, (2) faulty or defective Work appearing after Substantial Completion, (3) failure of the Work to comply with the requirements of the Contract Documents, or (4) terms of any special warranties required by the Contract Documents.

9.9.5 The acceptance of final payment shall constitute a waiver of all claims by the Contractor except those previously made in writing and identified by the Contractor as unsettled at the time of the final Application for Payment.

ARTICLE 10 - PROTECTION OF PERSONS AND PROPERTY

10.1 SAFETY PRECAUTIONS AND PROGRAMS

10.1.1 The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work.

10.2 SAFETY OF PERSONS AND PROPERTY

10.2.1 The Contractor shall take all reasonable precautions for the safety of, and shall provide all reasonable protection to prevent damage, injury or loss to: (1) all employees on the Work and all other persons who may be affected thereby; (2) all the Work and all materials and equipment to be incorporated therein, whether in storage on or off the site, under the care, custody or control of the Contractor or any of his Subcontractors or Sub-subcontractors; and (3) other neighboring property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

10.2.2 The Contractor shall give all notices and comply with all applicable laws, ordinances, rules, regulations and lawful orders of any public authority bearing on the safety of persons or property or their protection from damage, injury or loss.

10.2.3 The Contractor shall erect and maintain, as required by existing conditions and progress of the Work, all reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent utilities.

10.2.4 When the use or storage of explosives or other hazardous materials or equipment is necessary for the execution of the Work, the Contractor shall exercise the utmost care and shall carry on such activities under the supervision of properly qualified personnel.

10.2.5 The Contractor shall promptly remedy all damage or loss (other than damage or loss insured under Article 11) to any property referred to in Article 10 caused in whole or in part by the Contractor, any Subcontractor, any Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone whose acts any of them may be liable and for which the Contractor is responsible under Article 10 except damage or loss attributable to the acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either by of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to his obligations under Article 4.

10.2.6 The Contractor shall designate a responsible member of his organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and the Architect.

10.2.7 The Contractor shall not load or permit any part of the Work to be loaded so as to endanger its safety.

10.2.8 The Contractor shall comply with the applicable requirements of NFPA 241: **The Standard for Safeguarding Construction, Alteration, and Demolition** in connection with the Work. Contractor shall, prior to commencing Work on any new building and/or any significant alteration of existing building, submit for review and approval to the Worcester Fire Department a report prepared by a registered fire protection engineer evidencing that the Work shall such comply.

10.3 EMERGENCIES

10.3.1 In any emergency affecting the safety of persons or property, the Contractor shall act, at his discretion, to prevent threatened damage, injury or loss. Any additional compensation or extension of time claimed by the Contractor on account of emergency work shall be determined as provided in Article 12 for the Changes in the Work.

ARTICLE 11 - INSURANCE

11.1 CONTRACTOR'S LIABILITY INSURANCE

11.1.1 The Contractor shall purchase and maintain in a company or companies to which the Owner has no reasonable objection, such insurance as will protect him from claims set forth below which may arise out of or result from the Contractor's operations under the Contract, whether such operations be by himself or by any Subcontractor or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

(1) Workmen's Compensation –Massachusetts Statutory / Employers Liability
(2) Commercial Liability- Per Occurrence / Aggregate $1,000,000 / $2,000,000
(3) Automobile Liability/Combined Single Limit - $2,000,000 (all owned, hired and non-owned autos).
(4) Excess / Umbrella Liability –$2,000,000
(5) Independent Contractors -Same limits as above
(6) Products and Completed Operations -Same limits as above commencing with issuance of final Certificate of Payment.
(7) Contractual Liability - Same limits as above.

11.1.2 The insurance required by Article 11 shall include all major divisions of coverage, and shall be on a comprehensive general basis including Premises and Operations (including X-C-U), Owner's and Contractor's Protective Products and Completed Operations, and Owned, Non-owned, and Hired Motor Vehicles. Such insurance shall be written for not less than any limits of liability required by law or those set forth below, whichever is greater.

(1) Workmen's Compensation -Statutory/Employers Liability
(2) Commercial Liability - Per Occurrence / Aggregate $1,000,000.00 / 2,000,000.00
(3) Automobile Liability/Combined Single Limit – $2,000,000.00 (all owned, hired and non-owned autos).
(4) Excess / Umbrella Liability - $2,000,000.00
(5) Independent Contractors -Same limits as above
(6) Products and Completed Operations -Same limits as above commencing with issuance of final Certificate of Payment

(7) Contractual Liability - Same limits as above

11.1.3 The insurance required by Article 11 shall include contractual liability insurance applicable to the Contractor's obligations under Article 4.

11.1.4 Certificates of Insurance acceptable to the Owner shall be filed with the Owner. These Certificates shall contain a provision that coverage afforded under the policies will not be canceled until at least thirty (30) days prior written notice has been given to the Owner.

11.1.5 These certificates shall set forth evidence of all coverage required by Article 11. The Contractor shall furnish to the Owner copies of any endorsements that are subsequently issued amending limits of coverage.

11.2 OWNER'S LIABILITY INSURANCE

11.2.1 The Owner shall be responsible for maintaining his own liability insurance and, at his option, may purchase and maintain such insurance as will protect him against claims, which may arise from operations under the Contract.

11.3 PROPERTY INSURANCE

11.3.1 The Contractor shall purchase and maintain property insurance upon the entire Work at the site as provided above in Article 11. This insurance shall include the interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work and shall include "all risk" insurance for physical loss or damage including, without duplication of coverage, theft, vandalism and malicious mischief.

11.3.2 The Owner shall purchase and maintain such boiler and machinery insurance as may be required by the Contract Documents or by law. This insurance shall include the interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Work.

11.3.3 Any loss insured under Article 11 is to be adjusted with the Contractor and made payable to the Contractor as trustee for the insureds, as their interests may appear, subject to the requirements of any applicable mortgagee clause and of Subparagraph.

11.3.4 The Contractor shall pay each Subcontractor a just share of any insurance moneys received by the Contractor, and by appropriate agreement, written where legally required for validity, shall require each Subcontractor to make payments to his Sub-subcontractors in similar manner.

11.3.5 The Contractor shall file a copy of all policies with the Owner before an exposure to loss may occur. All property insurance shall remain in effect until the date of final completion or the date Premises/Property in put in service by the Owner, whichever is earlier.

11.3.6 The Owner and Contractor waive all rights against (1) each other and the Subcontractors, Sub-subcontractors, agents and employees each of the other, and (2) the Architect and separate contractors, if any, and their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other perils to the extent covered by insurance obtained pursuant to this Article 11 or any other property insurance applicable to the Work, except such rights as they may have to the proceeds of such insurance held by the Contractor as trustee. The foregoing waiver afforded the Architect, his agents and employees shall not extend to the liability imposed by Article 4. The Owner or the Contractor, as appropriate, shall require of the Architect, separate contractors, Subcontractors, and Sub-subcontractors by appropriate agreements, written where legally required for validity, similar waivers each in favor of all other parties enumerated in this Article 11.

11.3.7 If required in writing by any party in interest, the Contractor as trustee shall, upon the occurrence of an insured loss, give bond for the proper performance of his duties. He shall deposit in a separate account any money so received, and he shall distribute it in accordance with the direction of a court of competent jurisdiction.

11.3.8 The Contractor as trustee shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within five days after the occurrence of loss to the Contractor's exercise of this power. If such objection were made, the Contractor as trustee shall make settlement with the insurers in accordance with the direction of a court of competent jurisdiction.

11.4 LOSS OF USE INSURANCE

11.4.1 The Owner, at his option, may purchase and maintain such insurance as will insure him against loss of use of his property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of his property including consequential losses due to fire or other hazards however caused, to the extent covered by insurance under this Article 11.

ARTICLE 12 - CHANGES IN THE WORK

12.1 CHANGE ORDERS

12.1.1 The Owner, without invalidating the Contract, may order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and the Contract Time being adjusted accordingly. All such changes in the Work shall be authorized by Change Order, and shall be performed under the applicable conditions of the Contract Documents.

12.1.2 A Change Order is a written order to the Contractor signed by the Owner and the Architect, issued after execution of the Contract, authorizing a change in the Work or an adjustment in the Contract Sum or the Contract Time. Only Change Orders may change the Contract Sum and the Contract Time. A Change Order signed by the Contractor indicates his agreement therewith, including the adjustment in the Contract Sum or the Contract Time.

12.1.3 If the Contractor does not agree with the terms of the Change Order, the Contractor shall return the unsigned Change Order to the Owner. In such event, the Work, Contract Sum and/or Contract Time shall be adjusted as reflected in the Change Order, subject to the Contractor's rights under M.G.L. Chapter 30, Section 39J, but in no event shall the Contractor refuse to perform the Work as modified by the Change Order.

12.2 CLAIMS FOR ADDITIONAL COST

12.2.1 If the Contractor claims that any instructions or orders, whether oral, written, or drawings, or otherwise, involve extra cost or time, and such instructions or orders are not accompanied by a written acknowledgment by the Owner and Architect that extra payment will be made or time extended, he shall promptly so notify the Architect in writing and shall not proceed with the work until he has received a further written order to proceed, except, as provided in Article 10, in the case of an emergency affecting life or property.

12.2.2 Upon receipt from the Contractor of a written notice of claim as provided in Article 12, the Architect shall review such claim and if he determines that any work in dispute should proceed, he shall issue to the Contractor a written order, signed by the Owner, (1) to proceed in which he shall approve or deny the Contractor's claim, in whole or in part, or (2) to proceed subject to a later determination by the Architect of the Contractor's right to extra payment.

12.2.3 To the extent that the Architect, when issuing the written order to proceed described in Article 12, approves the contractor's claim, Change Order shall adjust the Contract Sum and/or Contract Time. If the Architect, when issuing his written order to proceed, denies, in whole or in part, the Contractor's claim, the Contractor shall proceed with the work without delay, subject to the Contractor's rights under M.G.L. Chapter 30, Section 39(J). If the Architect, when issuing his written order to proceed, instructs the Contractor to proceed with the work subject to a later determination by the Architect of the Contractor's right to extra payment or time, the Contractor shall proceed with the Work without delay or impact to the schedule.

12.2.4 No extension of time shall be granted because of seasonal or abnormal variations in temperature, humidity or precipitation, which conditions shall be wholly at the risk of the Contractor, whether occurring within the time originally scheduled for completion or within the period of any extension granted. There shall be no increase in the Contract Sum on account of any additional costs of operations or conditions resulting therefrom.

12.2.5 Time Limits on Claims: Claims by the Contractor must be made within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later. Claims must be made by written notice. An additional Claim made after the initial Claim has been implemented by Change Order will not be considered unless submitted in a timely manner.

12.3 MINOR CHANGES IN THE WORK

12.3.1 The Architect shall have the authority to order minor changes in the Work that do not involve an adjustment in the Contract Sum or an extension of the Contract Time, and are not inconsistent with the intent of the Contract Documents. Such changes shall be effected by written order, and shall be binding on the Owner and the Contractor. The Contractor shall carry out such written orders promptly without delay or impact to the schedule.

12.4 EQUITABLE ADJUSTMENTS

12.4.1 Equitable adjustments in the Contract Sum shall be determined according to one of the following methods, or a combination thereof; as determined by the Owner:

(1) fixed price basis, provided that the price shall be inclusive of items 3(a) through 3(d), below, and shall be computed in accordance with those provisions.
(2) estimated lump sum basis to be adjusted in accordance with Contract unit prices, or other agreed upon unit prices, provided that the unit prices shall be inclusive of all costs related to such equitable adjustments.
(3) time and materials basis, based upon a not to exceed, predetermined upset amount to be subsequently adjusted on the basis of actual costs comprised of items (a) through (d) below:
  (a) the costs at prevailing rates for direct labor, material and use of equipment;
  (b) plus, the costs of Workmen's Compensation Insurance, Liability Insurance, Federal Social Security and Massachusetts Unemployment Compensation; or as an alternative, the Contractor may elect to add a flat twenty-five (25%) percent to the total labor rate in (a), above;
  (c) plus, ten (10) percent of (a), above, for overhead, superintendence and profit which will be paid to the Contractor for the work of the Contractor and all his subcontractors. The contracting parties referred to in this subparagraph shall agree upon the distribution of the ten (10) percent as a matter of contract between each other;
  (d) plus actual direct premium costs of payment and performance bonds required of the Contractor provided there would be an appropriate credit for premiums for a credit change order.

12.4.2 If the net change is an addition to the Contract Sum, it shall include the Contractor's overhead, superintendence and profit. On any change that involves a net credit, no allowance for overhead superintendence and profit shall be figured. For any change that does not include labor performed or materials installed in the Project, there will be no markup for the contractor's overhead, superintendence, and profit, notwithstanding any net increase in the Contract Sum. Charges for small tools known as "tools of the trade" are not to be computed in the amount of an equitable change.

ARTICLE 13 - UNCOVERING AND CORRECTION OF WORK

13.1 UNCOVERING OF WORK

13.1.1 If any portion of the Work should be covered contrary to the request of the Architect or to requirements specifically expressed in the Contract Documents, it must, if required in writing by the Architect, be uncovered for his observation and shall be replaced at the Contractor's expense.

13.1.2 If any other portion of the Work has been covered which the Architect has not specifically requested to observe prior to being covered, the Architect, with the approval of the Owner, may request to see such Work and it shall be uncovered by the Contractor. If such Work is found in accordance with the Contract Documents, appropriate Change Order shall charge the cost of uncovering and replacement charged to the Owner. If such Work is found not in accordance with the Contract Documents, the Contractor shall pay such costs unless it is found that this condition was caused by the Owner or a separate contractor as provided in Article 6, in which event the Owner shall be responsible.

13.2 CORRECTION OF WORK

13.2.1 The Contractor shall promptly correct all Work rejected by the Architect as defective or as failing to conform to the Contract Documents whether observed before or after Substantial Completion and whether or not fabricated, installed or completed. The Contractor shall bear all costs of correcting such rejected Work, including compensation for the Architect's additional services made necessary thereby and any costs, loss, or damages to the Owner resulting from such failure or defect.

13.2.2 If, within one (1) year after the Date of Substantial Completion of the Work or designated portion thereof or within one (1) year after acceptance by the Owner of designated equipment or within such longer period of time as may be prescribed by law or by the terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be defective or not in accordance with the Contract Documents, the Contractor shall correct it promptly after receipt of a written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. This obligation shall survive termination of the Contract. The Owner shall give such notice promptly after discovery of the condition.

13.2.3 The Contractor shall remove from the site all portions of the Work which are defective or non-conforming and which have not been corrected under Articles 4 and 13, unless the Owner waives removal.

13.2.4 If the Contractor fails to correct defective or non-conforming Work as provided in Articles 4 and 13, the Owner may correct it in accordance with Article 3.

13.2.5 If the Contractor does not proceed with the correction of such defective or non-conforming Work within a reasonable time fixed by written notice from the Architect, the Owner may remove it and may store the materials or equipment at the expense of the Contractor. If the Contractor does not pay the cost of such removal and storage within ten (10) days thereafter, the Owner may upon ten (10) additional days written notice, sell such Work at auction or at private sale and shall account for the net proceeds thereof, after deducting all the costs that should have been borne by the Contractor, including compensation for the Architect's additional services made necessary thereby. If such proceeds of sale do not cover all costs, which the Contractor should have borne, the difference shall be charged to the Contractor and an appropriate Change Order shall be issued. If the payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the Owner.

13.2.6 The Contractor shall bear the cost of making good all work of the Owner or separate contractors destroyed or damaged by such correction or removal.

13.2.7 Nothing contained in this Article 13 shall be construed to establish a period of limitation with respect to any other obligation, which the Contractor might have under the Contract Documents, including Article 4 hereof. The establishment of the time period of one (1) year after the Date of Substantial Completion or such longer period of time as may be prescribed by law or by the terms of any warranty required by the Contract Documents relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which his obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to his obligations other than specifically to correct the Work.

13.3 ACCEPTANCE OF DEFECTIVE OR NON-CONFORMING WORK

13.3.1 If the Owner prefers to accept defective or non-conforming Work, he may do so instead of requiring its removal and correction, in which case a Change Order will be issued to reflect a reduction in the Contract Sum where appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

END OF SECTION

SUPPLEMENTARY GENERAL CONDITIONS

STATUTORY PROVISIONS FOR MASSACHUSETTS PUBLIC CONSTRUCTION CONTRACTS CONTENTS

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1.2	Delays	M.G.L. Chapter 30, Section 39O
1.3	Deviations	M.G.L. Chapter 30, Section 39I
1.4	Finality of Decisions	M.G.L. Chapter 30, Section 39J
1.5	Differing Site Conditions	M.G.L. Chapter 30, Section 39N
1.6	Timely Decisions	M.G.L. Chapter 30, Section 39P
1.7	Certificate of Appropriation	M.G.L. Chapter 44, Section 31C
1.8	Method of Payment (Public Building Projects)	M.G.L. Chapter 30, Section 39K
1.9	Method of Payment (Public Works Projects)	M.G.L. Chapter 30, Section 39G
1.10	Direct Payment	M.G.L. Chapter 30, Section 39F
1.11	Discharge or Release of Bonds	M.G.L. Chapter 30, Section 40

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2.2	Determination of Wage Rates	M.G.L. Chapter 149, Section 27
2.3	Employment Records	M.G.L. Chapter 149, Section 27B
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2.5	Reserve Police Officers	M.G.L. Chapter 149, Section 34B
2.6	Eight-hour Day, etc.	M.G.L. Chapter 149, Sections 30 and 34
2.7	Lodging, etc.	M.G.L. Chapter 149, Section 25
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ARTICLE 4 – MISCELLANEOUS

4.1	Weather Protection	M.G.L. Chapter 149, Section 44F(1)
4.2	Form for Sub-Contract	M.G.L. Chapter 149, Section 44(F)(4)(c)
4.3	Foreign Corporations	M.G.L. Chapter 30, Section 39L

4.4	Shoring	M.G.L. Chapter 149, Section 129A
4.5	Compliance with Tax Laws	M.G.L. Chapter 62C, Section 49A
4.6	Verification of Construction Debris Disposal	2008 Worcester Revised Ordinances, Chapter 8, Section 7
4.7	Responsible Employer Ordinance	2008 Worcester Revised Ordinances, Chapter 2, Section 35
4.8	Regulation of Construction Noise	2008 Worcester Revised Ordinances, Chapter 8, Section 34
4.9	Regulation of Excessive and Unreasonable Noise	2008 Worcester Revised Ordinances, Chapter Nine, Section 1A(e)(9)

SUPPLEMENTARY GENERAL CONDITIONS
STATUTORY PROVISIONS FOR MASSACHUSETTS
PUBLIC CONSTRUCTION CONTRACTS

The following provisions are required by or are intended to be consistent with requirements of Massachusetts statutes governing public construction contracts in the Commonwealth of Massachusetts (hereinafter referred by statute to be included herein shall be deemed to be so included. In addition, the parties recognize that other rights, duties, and obligations with respect to public construction contracts are provided for in the Contract Documents. In case of conflict between the provisions of these Supplementary General Conditions and other provisions in the Contract Documents, the provisions of these Supplementary General Conditions shall govern. In case of conflict between the provisions of these Supplementary General Conditions and the provisions of any applicable statute, the statutory provisions shall govern. Where the term "awarding authority" appears in the following paragraphs, it shall be taken as meaning the Owner.

ARTICLE 1 – PAYMENT, CONTRACT ADMINISTRATION, etc.

1.1 "Or Equal" Clause: (Statutory reference: M.G.L. Chapter 30, Section 39M(b))
This Paragraph 1.1 applies to every contract subject to M.G.L. Chapter 30, Section 39M(b).

This Paragraph 1.1 applies to every contract for the construction, reconstruction or repair of any public work or for the purchase of any material by the Commonwealth, any political subdivision thereof, or any county, city, town, district or housing authority (above certain dollar limits, as stated in the statute), and to contracts awarded pursuant to M.G.L. Chapter 149, Sections 44A through 44H. The said Sections 44A through 44H apply to every contract for the construction, reconstruction, installation, demolition, maintenance or repair of any building by a department, agency, board, commission, authority, or other instrumentality or the Commonwealth or political subdivision thereof, or two or more subdivisions thereof, but not including the Massachusetts Bay Transportation Authority, estimated to cost more than a dollar amount set forth in M.G.L. Chapter 149, Section 44A.

Every such contract shall provide that an item equal to that named or described in the said specifications may be furnished. Where products or materials are prescribed by manufacturer name, trade name, or catalog reference, the words "or approved equal" shall be understood to follow. An item shall be considered equal to the item so named or described if, in the opinion of the awarding authority:

a. It is at least equal in quality, durability, appearance, strength, and design;

b. it will perform at least equally the function imposed by the general design for the public work being contracted for or the material being purchased, and

c. it conforms substantially, even with deviations, to the detailed requirements for the items as indicated by the specifications. For each item of material the specifications shall provide for either a minimum of three named brands of material or a description of material which can be met by a minimum of three manufacturers or producers, and for the equal of any one of said name or described materials.

Any structural or mechanical changes made necessary to accommodate substituted equipment under this paragraph shall be at the expense of the Contractor or Subcontractor responsible for the work item. See other paragraphs of General and Supplementary Conditions for procedures to be used in determining compliance with the standards of this paragraph.

1.2 Delays: (Statutory reference: Chapter 30, Section 39O). This Paragraph 1.2 applies to every contract subject to M.G.L. Chapter 30, Section 39M and to every contract subject to Chapter 149, Sections 44A through 44H.

In the event a suspension, delay, interruption or failure to act of the awarding authority increases the cost of performance to any subcontractor, that subcontractor shall have the same rights against the general contractor for payment for an increase in the cost of his performance as provisions (a) and (b) give the general contractor against the awarding authority, but nothing in provisions (a) and (b) shall in any way change, modify or alter any other rights which the general contractor or the subcontractor may have against each other.

Except as otherwise provided by law and by this Paragraph 1.2, the Contractor shall not be entitled to damages on account of any hindrances or delays, avoidable or unavoidable; but if such delay be occasioned by the awarding authority, the Contractor may be entitled to an extension of time only, in which to complete the work, to be determined by the Architect.

(a) The awarding authority may order the general contractor in writing to suspend, delay, or interrupt all or any part of the work for such period of time as it may determine to be appropriate for the convenience of the awarding authority; provided however, that if there is a suspension, delay or interruption for fifteen days or more or due to a failure of the awarding authority to act within the time specified in this contract, the awarding authority shall make an adjustment in the contract price for any increase in the cost of performance of this contract but shall not include any profit to the general contractor on such increase; and provided further, that the awarding authority shall not make any adjustment in the contract price under this provision for any suspension, delay, interruption or failure to act to the extent that such is due to any cause for which this contract provides for an equitable adjustment of the contract price under any other contract provisions.
(b) The general contractor must submit the amount of a claim under provision (a) to the awarding authority in writing as soon as practicable after the end of the suspension, delay, interruption or failure to act and, in any event, not later than the date of final payment under this contract and, except for costs due to a suspension order, the awarding authority shall not approve any costs in the claim incurred more than twenty days before the general

contractor notified the awarding authority in writing of the act or failure to act involved in the claim.

1.3 Deviations: (Statutory referenced: M.G.L. Chapter 30, section 39I) This Paragraph 1.3 applies to every contract for the construction, alteration, maintenance, repair or demolition of, or addition to, any public building or public works for the Commonwealth or any political subdivision thereof.

The Contractor shall perform all the work required by this contract in conformity with the plans and specifications contained therein. No willful and substantial deviation from said plans and specifications shall be made unless authorized in writing by the awarding authority or by the Engineer or Architect in charge of the work who is duly authorized by the awarding authority to approve such deviations. In order to avoid delays in the prosecution of the work required by such contract, such deviation from the plans or specifications may be authorized by a written order of the awarding authority or such Engineer or Architect so authorized to approve such deviation. Within thirty days thereafter, such written order shall be confirmed by a certificate of the awarding authority stating: (1) If such deviation involves any substitution or elimination of materials, fixtures or equipment, the reasons why such materials, fixtures or equipment were included in the first instance and the reasons for substitution or elimination, and, if the deviation is of any other nature, the reasons for such deviation, giving justification therefor
(2) that the specified deviation does not materially injure the project as a whole;
(3) that either the work substituted for the work specified is the same cost and quality, or that an equitable adjustment has been agreed upon between the awarding authority and the Contractor and the amount in dollars of said adjustment; and (4) that the deviation is in the best interest of the awarding authority.

Such certificate shall be signed under the penalties of perjury and shall be a permanent part of the file record of the work contracted for.

Whoever violates any provision of this section wilfully and with intent to defraud shall be punished by a fine of not more than five thousand dollars or by imprisonment for not more than six months, or both.

1.4 Finality of Decisions by Awarding Authority or Architect: (Statutory reference: M.G.L. Chapter 30, Section 39J) This Paragraph 1.4 applies to every contract for the construction, reconstruction, alteration, remodeling, repair or demolition of any public building or public works by the Commonwealth or by any county, city, district, board, commission, or other public body, when the amount of the contract exceeds the amount stated in M.G.L. Chapter 30, Section 39J.

Notwithstanding any contrary provision of this contract, a decision by the contracting body or by any administrative board, official or agency, or by any architect or engineer, on a dispute, whether of fact or of law, arising under said contract shall not be final or conclusive if such decision is made in bad faith, fraudulently, capriciously, or arbitrarily, is unsupported by substantial evidence, or is based upon error of law.

1.5 Differing Site Conditions: (Statutory reference: M.G.L. Chapter 30, Section 39N) This Paragraph 1.5 applies to every contract subject to M.G.L. Chapter 30, Section 39M and to every contract subject to M.G.L. Chapter 49, Sections 44A through 44H.

If, during the progress of the work, the Contractor or the awarding authority discovers that the actual subsurface or latent physical conditions encountered at the site differ substantially or materially from those shown on the plans or indicated in the Contract Documents, either the Contractor or the contracting authority may request an equitable adjustment in the contract price of the contract applying to work affected by the differing site conditions. A request for such an adjustment shall be in writing and shall be delivered by the party making such claim to the other party as soon as possible after such conditions are discovered. Upon receipt of such a claim from a Contractor, or upon its own initiative, the awarding authority shall make an investigation of such physical conditions, and, if they differ substantially or materially from those shown on the plans or indicated in the Contract Documents or from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the plans and Contract Documents and are such a nature as to cause an increase or decrease in the cost of the work, the contracting authority shall make an equitable adjustment in the contract price and the contract shall be modified in writing accordingly.

1.6 Timely Decision by Awarding Authority: (Statutory reference: M.G.L. Chapter 30, Section 39P) This Paragraph 1.6 applies to every contract subject to M.G.L. Chapter 30, Section 39M, and to every contract subject to M.G.L. Chapter 149, Sections 44A through 44H.

In every case in which this contract requires the awarding authority, any official, its Architect or Engineer to make a decision on interpretation of the specifications, approval of equipment, material or any other approval, or progress of the work, the decision shall be made promptly and, in any event, no later than thirty days after the written submission for decision; but if such decision requires extended investigation and study, the awarding authority, the official, Architect or Engineer shall, within thirty days after the receipt of the submission, give the party making the submission written notice of the reasons why the decision cannot be made within the thirty-day period and the date by which the decision will be made.

1.7 Certificate of Appropriation: (Statutory reference: M.G.L. Chapter 44, Section 31C) This Paragraph 1.7 applies to contracts for construction, reconstruction, alteration, remodeling, repair or demolition of any public building or public work by any city or town costing more than the amount set forth in M.G.L. Chapter 44, Section 31C.

This Contract shall not be deemed to have been made until the auditor or accountant or other officer of the city or town having similar duties has certified thereon that an appropriation in the amount of such contract is available therefor and that an officer or agent of the city, town, or awarding-authority has been authorized to execute said contract and approve all requisitions and change orders. No order to the Contractor for a change in or addition to the work to be performed under a contract subject to this section, whether in the form of a drawing, plan, detail or any other written instruction, unless it is an order which the Contractor is willing to perform without any increase in the contract price, shall be deemed to have been given until the auditor or accountant, or other officer of the awarding authority having similar duties, has certified thereon that an appropriation in the amount of such order is available therefor; but such certificate shall not be construed as an admission by the awarding authority of its liability to pay for such work. The certificate of the auditor or accountant or other officer of the awarding authority having similar duties, that an appropriation in the amount of such contract or order is available shall bar any defense by the awarding authority on the ground of insufficient appropriation; and any law barring payment in excess of appropriations shall not apply to amounts covered by any certificate under this section.

1.8 Method of Payment: (Statutory reference: M.G.L. Chapter 30, Section 39K) This Paragraph 1.8 applies to every contract for the construction, reconstruction, alteration, remodeling, repair or demolition of any public building by the Commonwealth, or by any county, city, town, district, board, commission or other public body, when the amount is more than two thousand dollars, or the amount set forth in M.G.L. Chapter 30, Section 39K.

1.8.1 Within fifteen days after receipt from the Contractor, at the place designated by the awarding authority if such a place is so designated, of a periodic estimate requesting payment of the amount due for the preceding month, the awarding authority will make a periodic payment to the Contractor for the work performed during the preceding month and for the materials not incorporated in the work but delivered and suitably stored at the site (or at some location agreed upon in writing) to which the Contractor has title or to which a Subcontractor has title and has authorized the Contractor to transfer title to the awarding authority, upon certification by the contractor that he is the lawful owner and that the materials are free from all encumbrances, but less (1) a retention based on its estimate of the fair value of its claims against the Contractor and less (2) a retention for direct payments to Subcontractors based on demands for same in accordance with the provisions of Paragraph 1.10 of these Supplementary General Conditions, and less (3) a retention not exceeding five percent of the approved amount of the periodic payment. After the receipt of a periodic estimate requesting final payment and within sixty-five days after (a) the Contractor fully completes the work or substantially completes the work so that the value of the work remaining to be done is, in the estimate of the awarding authority, less than one percent of the original contract price, or (b) the Contractor substantially completes the work and the awarding authority takes possession for occupancy, whichever occurs first, the awarding authority shall pay the contractor the entire balance due on the contract less (1) a retention based on its estimate of the fair value of its claims against the Contractor and of the cost of completing the incomplete and unsatisfactory items of work and less (2) a retention for direct payments to Subcontractors based

on demands for same in accordance with the provisions of Paragraph 1.10 of these Supplementary General Conditions, or based on the record of payments by the Contractor to the Subcontractors under this contract if such record of payment indicates that the Contractor has not paid Subcontractors as provided in Paragraph 1.10. If the awarding authority fails to make payment as herein provided, there shall be added to each such payment daily interest at the rate of three percentage points above the rediscount rate then charged by the Federal Reserve Bank of Boston commencing on the first day after said payment is due and continuing until the payment is delivered or mailed to the contractor; provided, that no interest shall be due, in any event, on the amount due on a periodic estimate for final payment until fifteen days…after receipt of such periodic estimate from the Contractor, at the place designated by the awarding authority if such a place is so designated. The Contractor agrees to pay to each Subcontractor a portion of any such interest paid in accordance with the amount due each Subcontractor.

1.8.2 The awarding authority may make changes in any periodic estimate submitted by the Contractor, and the payment due on said periodic estimate shall be computed in accordance with the change so made, but such changes or any requirement for a corrected periodic estimate shall not affect the due date for the periodic payment or the date for the commencement of interest charges on the amount of the periodic payment computed in accordance with the changes made, as provided herein; provided, that the awarding authority may, within seven days after receipt, return to the Contractor for correction, any periodic estimate which is not in the required form or which contains computations not arithmetically correct and, in that event, the date of receipt of such periodic estimate shall be the date of receipt of the corrected periodic estimate in proper form and with arithmetically correct computations. The date of receipt of a periodic estimate received on a Saturday shall be the first working day thereafter.

1.8.3 All periodic estimates shall be submitted to the awarding authority, or to its designee as set forth in writing to the Contractor, and the date of receipt by the awarding authority or its designee shall be marked on the estimate. All periodic estimates shall contain a separate item for each subtrade and each sub-subtrade listed in sub-bid form as required by the specifications, and a column listing the amount paid to each subcontractor and sub-subcontractor as of the date the periodic estimate is filed. The person making payment for the awarding authority shall add the daily interest provided for herein to each payment for each day beyond the due date based on the date of receipt marked on the estimate.

1.8.4 A certificate of the Architect to the effect that the Contractor has fully or substantially completed the work shall, subject to the provisions of Paragraph 1.4 of these Supplementary General Conditions, be conclusive for the purposes of this Paragraph 1.8.

1.8.5 Notwithstanding the provisions of this section, at any time after the value of the work remaining to be done is, in the estimation of the awarding authority, less than 1 per cent of the adjusted contract price, or the awarding authority has determined that the contractor has substantially completed the work and the awarding authority has taken possession for occupancy, the awarding authority may send to the general contractor by certified mail, return receipt

requested, a complete and final list of all incomplete and unsatisfactory work items, including, for each item on the list, a good faith estimate of the fair and reasonable cost of completing such item. The general contractor shall then complete all such work items within 30 days of receipt of such list or before the contract completion date, whichever is later. If the general contractor fails to complete all incomplete and unsatisfactory work items within 45 days after receipt of such items furnished by the awarding authority or before the contract completion date, whichever is later, subsequent to an additional 14 days written notice to the general contractor by certified mail, return receipt requested, the awarding authority may terminate the contract and complete the incomplete and unsatisfactory work items and charge the cost of same to the general contractor and such termination shall be without prejudice to any other rights or remedies the awarding authority may have under the contract. The awarding authority shall note any such termination in the evaluation form to be filed by the awarding authority pursuant to the provisions of section 44D of chapter 149.

1.9 Method of Payment: (Statutory reference: M.G.L. Chapter 30, section 39G) This Paragraph 1.9 applies to every contract for the construction, reconstruction, alteration, remodeling, repair or improvement of public ways; including bridges and other highway structures, sewers and water mains, airports and other public works entered into with the commonwealth, or any agency or political subdivision thereof.

1.9.1 Upon substantial completion of the work required by a contract with the commonwealth, or any agency or political subdivision thereof, for the construction, reconstruction, alteration, remodeling, repair or improvement of public ways, including bridges and other highway structures, sewers and water mains, airports and other public works, the contractor shall present in writing to the awarding authority its certification that the work has been substantially completed. Within twenty-one days thereafter, the awarding authority shall present to the contractor either a written declaration that the work has been substantially completed or an itemized list of incomplete or unsatisfactory work items required by the contract sufficient to demonstrate that the work has not been substantially completed. The awarding authority may include with such list a notice setting forth a reasonable time, which shall not in any event be prior to the contract completion date, within which the contractor must achieve substantial completion of the work. In the event that the awarding authority fails to respond, by presentation of a written declaration or itemized list as aforesaid, to the contractor's certification within the twenty-one day period, the contractor's certification shall take effect as the awarding authority's declaration that the work has been substantially completed.

1.9.2 Within sixty-five days after the effective date of a declaration of substantial completion, the awarding authority shall prepare and forthwith send to the contractor for acceptance a substantial completion estimate for the quality and price of the work done and all but one percent retainage on that work, including the quantity, price and all but one percent retainage for the undisputed part of each work item and extra work item in dispute but excluding the disputed part thereof, less the estimated cost of completing all incomplete and unsatisfactory work items and less the total periodic payments made to date for the work. The awarding authority also shall deduct from the substantial completion estimate an amount equal to the sum of all demands for direct payments

filed by subcontractors and not yet paid to subcontractors or deposited in joint accounts pursuant to section 1.10, but no contract subject to said section 1.10 shall contain any other provision authorizing the awarding authority to deduct any amount by virtue of claims asserted against the contract by subcontractors, material suppliers or others.

1.9.3 If the awarding authority fails to prepare and send to the contractor any substantial completion estimate required by section 1.9.2, on or before the date herein above set forth, the awarding authority shall pay to the contractor interest on the amount which would have been due to the contractor pursuant to such substantial completion estimate, at the rate of three percentage points above the rediscount rate then charged by the Federal Reserve Bank of Boston from such date to the date on which the awarding authority sends that substantial completion estimate to the contractor for acceptance or to the date of payment therefor, whichever occurs first. The awarding authority shall include the amount of such interest in the substantial completion estimate.

1.9.4 Within fifteen days after the effective date of the declaration of substantial completion, the awarding authority shall send to the contractor by certified mail, return receipt requested, a complete list of all incomplete or unsatisfactory work items, and unless delayed by causes beyond his control, the contractor shall complete all such work items within forty-five days after the receipt of such list or before the then contract completion date, whichever is later. If the contractor fails to complete such work within such time, the awarding authority may, subsequent to seven days' written notice to the contractor by certified mail, return receipt requested, terminate the contract and complete the incomplete or unsatisfactory work items and charge the cost of same to the contractor.

1.9.5 Within thirty days after receipt by the awarding authority of a notice from the contractor stating that all of the work required by the contract has been completed, the awarding authority shall prepare and forthwith send to the contractor for acceptance, a final estimate for the quantity and price of the work done and all retainage on that work less the payments made to date, unless the awarding authority's inspection shows that work items required by the contract remain incomplete or unsatisfactory, or that documentation required by the contract has not been completed. If the awarding authority fails to prepare and sends to the contractor the final estimate within thirty days after receipt of notice of completion, the awarding authority shall pay to the contractor interest on the amount which would have been due to the contractor pursuant to such final estimate at the rate hereinabove provided from the thirtieth day after such completion until the date on which the awarding authority sends the final estimate to the contractor for acceptance or the date of payment therefor, whichever occurs first, provided that the awarding authority's inspection shows that no work items required by the contract remain incomplete or unsatisfactory. Interest shall not be paid hereunder on amounts for which interest is required to be paid in connection with the substantial completion estimate as hereinabove provided. The awarding authority shall include the amount of the interest required to be paid hereunder in the final estimate.

1.9.6 The awarding authority shall pay the amount due pursuant to any substantial completion or final estimate within thirty-five days after receipt of written acceptance for such estimate from the contractor and shall pay interest on the amount due pursuant to such estimate at the rate hereinabove provided from that thirty-fifth day to the day of payment. Within 15 days after receipt from the contractor, if such place is so designated by the awarding authority, if such place is so designated, of a periodic estimate requesting payment of the amount due for the preceding periodic estimate period, the awarding authority shall make a periodic payment to the contractor for the work performed during the preceding periodic estimate period and for the materials not incorporated in the work but delivered and suitably stored at the site, or at some location agreed upon in writing, to which the contractor has title or to which a subcontractor has title and has authorized the contractor to transfer title to the awarding authority, upon certification by the contractor that he is the lawful owner and that materials are free from all encumbrances. The awarding authority shall include with each such payment interest on the amount due pursuant to such periodic estimate at the rate herein above provided from the due date. In the case of periodic payments, the contracting authority may deduct from its payment a retention based on its estimate of the fair value of its claim against the contractor, a retention for direct payments to subcontractors based on demands for same in accordance with the provisions of section 1.10, and a retention to secure satisfactory performance of the contractual work not exceeding five percent of the approved amount of any periodic payment, and the same right to retention shall apply to bonded subcontractors entitled to direct payment under section 1.10; provided, that a five percent value of all items that are planted in the ground shall be deducted from the periodic payments until final acceptance.

1.9.7 No periodic, substantial completion or final estimate or acceptance or payment thereof shall bar a contractor from reserving all rights to dispute the quantity and amount of, or the failure of the awarding authority to approve a quantity and amount of, all or part of any work item or extra work item.

1.9.8 Substantial completion, for the purpose of this section 1.9, shall mean either that the work required by the contract has been completed except for work having a contract price of less than one percent of the then adjusted total contract price, or substantially all of the work has been completed and opened to public use except for minor incomplete or unsatisfactory work items that do not materially impair the usefulness of the work required by the contract.

1.10 Direct Payment: (Statutory reference: M.G.L. Chapter 30, Section 39F) This Paragraph 1.10 applies to every contract awarded pursuant to M.G.L. Chapter 149, Sections 44A through 44J, and (with the exception of Subparagraph 1.10.9) to every contract awarded pursuant to M.G.L. Chapter 30, Section 39M.

1.10.1 Forthwith after the General Contractor receives payment on account of a periodic estimate, the General Contractor shall pay to each subcontractor the amount paid for the labor performed and the materials furnished by that Subcontractor, less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the Subcontractor by the General Contractor.

1.10.2 Not later than the sixty-fifth day after each Subcontractor substantially completes the work in accordance with the plans and specifications, the entire balance due under the subcontract, less amounts retained by the awarding authority as the estimated cost of completing the incomplete and unsatisfactory items of work, shall be due the Subcontractor; and the awarding authority shall pay that amount to the General Contractor. The General Contractor shall forthwith pay to the Subcontractor the full amount received from the awarding authority less any amount specified in any court proceedings barrings such payment and also less any amount claimed due from the Subcontractor by the General Contractor.

1.10.3 Each payment made by the awarding authority to the General Contractor pursuant to Subparagraphs 1.10.1 and 1.10.2 of this Paragraph 1.10 for the labor performed and the materials furnished by a Subcontractor shall be made to the General Contractor for the account of that Subcontractor; and the awarding authority shall take reasonable steps to compel the General Contractor to make each such payment to each such Subcontractor. If the awarding authority has received a demand for direct payment from a Subcontractor for any amount which has already been included in a payment to the General Contractor for payment to the Subcontractor as provided in Subparagraphs 1.10.1 and 1.10.2, the awarding authority shall act upon the demand as provided in this Paragraph 1.10.

1.10.4 If, within seventy days after the Subcontractor has substantially completed the subcontract work, the Subcontractor has not received from the Contractor the balance due under the subcontract including any amount due for extra labor and materials furnished to the General Contractor, less any amount retained by the awarding authority as to the estimated cost of completing the incomplete and unsatisfactory items of work, the Subcontractor may demand direct payment of that balance from the awarding authority. The demand shall be by a sworn statement delivered to or sent by certified mail to the awarding authority, and a copy shall be delivered to or sent by certified mail to the General Contractor at the same time. The demand shall contain a detailed breakdown of the balance due under the subcontract and also a statement of the status of completion of the subcontract work. Any demand made after substantial completion of the subcontract work shall be valid even if delivered or mailed prior to the seventieth day after the Subcontractor has substantially completed the subcontract work. Within ten days after the Subcontractor has delivered or so mailed the demand to the awarding authority and delivered or so mailed a copy to the General Contractor, the General Contractor may reply to the demand. The reply shall be a sworn statement delivered to or sent by certified mail to the awarding authority, and a copy shall be delivered to or sent by certified mail to the Subcontractor at the same time. The reply shall contain a detailed breakdown of the balance due under the subcontract, including

any amount due for extra labor and materials furnished to the General Contractor and of the amount due for each claim made by the General Contractor against the Subcontractor.

1.10.5 Within fifteen days after receipt of the demand by the awarding authority, but in no event prior to the seventieth day after substantial completion of the subcontract work, the awarding authority shall make direct payment to the Subcontractor of the balance due under the subcontract, including any amount due for extra labor and materials furnished to the General Contractor, less any amount (i) retained by the awarding authority as the estimated cost of completing the incomplete or unsatisfactory items of work, (ii) specified in any court proceedings barring such payment, or (iii) disputed by the General Contractor in the sworn reply; provided, that the awarding authority shall not deduct from a direct payent any amount as provided in part (iii) if the reply is not sworn to, or for which the sworn reply does not contain the detailed breakdown required by Subparagraph 1.10.4. The awarding authority shall make further direct payments to the Subcontractor forthwith after the removal of the basis for deduction from direct payments made as provided in parts (i) and (ii) of this Subparagraph.
1.10.6 The awarding authority shall forthwith deposit the amounts deducted from a direct payment as provided in part (iii) of the Subparagraph 1.10.5 in an interest-bearing joint account in the names of the General Contractor and the Subcontractor in a bank in Massachusetts selected by the awarding authority or agreed upon by the General Contractor and the Subcontractor and shall notify the General Contractor and the Subcontractor of the date of the deposit and the account, including accrued interest, as provided in an agreement between the General Contractor and the Subcontractor or as determined by decree of a court of competent jurisdiction.

1.10.7 All direct payments and all deductions from demands for direct payments deposited in an interest-bearing account or accounts in a bank pursuant to Subparagraph 1.10.6 shall be made out of amounts payable to the General Contractor at the time of receipt of a demand for direct payment from a Subcontractor and out of amounts which later become payable to the General Contractor and in the order or receipt of such demands from subcontractors. All direct payments shall discharge the obligation of the awarding authority to the Contractor to the extent of such payment.

1.10.8 The awarding authority shall deduct from payments to a General Contractor amounts which, together with the deposits in interest-bearing accounts pursuant to Subparagraph 1.10.6, are sufficient to satisfy all unpaid balances of demands for direct payments received from Subcontractors. All such amounts shall be earmarked for such direct payments, and the Subcontractors shall have a right in such deductions prior to any claims against such amounts by creditors of the General Contractor.

1.10.9 If the Subcontractor does not receive payment as provided in Subparagraph 1.10.1 or if the General Contractor does not submit a periodic estimate for the value of the labor or materials performed or furnished by the Subcontractor and the Subcontractor does not receive payment for same when due less the deductions provided for in Subparagraph 1.10.1, the Subcontractor may demand direct payment by following the procedure in Subparagraph 1.10.4 and the General Contractor may file a sworn reply as provided in that same Subparagraph. A demand made after

the first day of the month following that for which the Subcontractor performed or furnished the labor and materials for which the Subcontractor seeks payment shall be valid even if delivered or mailed prior to the time payment was due on a periodic estimate from the General Contractor. Thereafter the awarding authority shall proceed as provided in Subparagraphs 1.10.5, 1.10.6, 1.10.7 and 1.10.8.

1.10.10 Any assignment by a Subcontractor of the rights under this section to a surety company furnishing a bond under the provisions of M.G.L. Chapter 149, Section 29 shall be invalid. The assignment and subrogation rights of the surety to amounts included in a demand for direct payment which are in the possession of the awarding authority or which are on deposit pursuant to Subparagraph 1.10.6 shall be subordinate to the rights of all Subcontractors who are entitled to be paid under this section and who have not been paid in full.

1.10.11 "Subcontractor" as used in this Paragraph 1.10 (i) for contracts awarded as provided in M.G.L. Chapter 149, Sections 44A-44J, inclusive, shall mean a person who files a sub-bid and receives a subcontract as a result of that filed sub-bid or who is approved by the awarding authority in writing as a person performing labor or both performing labor and furnishing materials pursuant to a contract with the General Contractor, (ii) for contracts awarded as provided in M.G.L. Chapter 30, Section 39M(a), shall mean a person approved by the awarding authority in writing as a person performing labor or both performing labor and furnishing materials pursuant to a contract with the General Contractor.

1.10.12 A General Contractor or a Subcontractor shall enforce a claim to any portion of the amount of a demand for direct payment deposited as provided in Subparagraph 1.1.6 by a petition in equity in the superior court against the other and the bank shall not be a necessary party. A Subcontractor shall enforce a claim for direct payment or a right to require a deposit as provided in Subparagraph 1.10.6 by a petition in equity in the superior court against the awarding authority and the Contractor shall not be a necessary party. Upon motion of any party the court shall advance for speedy trial any petition filed as provided in this paragraph. M.G.L. Chapter 231, Sections 59 and 59B shall apply to such petitions. The Court shall enter an interlocutory decree upon which execution shall issue for any part of a claim found due pursuant to Sections 59 and 59B and, upon motion of any party, shall advance for speedy trial the petition to collect the remainder of the claim. Any party aggrieved by such interlocutory decree shall have the right to appeal therefrom as from a final decree. The court shall not consolidate for trial the petition of any Subcontractor with the petition of one or more Subcontractors or the same general contract unless the court finds that a substantial portion of the evidence of the same events during the course of construction (other than the fact that the claims sought to be consolidated arise under the same general contract) is applicable to the petitions sought to be consolidated and that such consolidation will prevent unnecessary duplication of evidence. A decree in any such proceeding shall not include interest on the disputed amount deposited in excess of the interest earned for the period of any such deposit. No person except a Subcontractor filing a demand for direct payment for which no funds due the Contractor are available for direct payment shall have a right to file a petition in a court of equity against the awarding authority claiming a demand for direct payment is premature, and such

Subcontractor must file the petition before the awarding authority has made a direct payment to the Subcontractor and has made a deposit of the disputed portion as provided in part (iii) of Subparagraph 1.10.5 and in Subparagraph 1.10.6.

1.10.13 In any petition to collect any claim for which a Subcontractor has filed a demand for direct payment the court shall, upon motion of the General Contractor, reduce by the amount of any deposit of a disputed amount by the awarding authority as provided in part (iii) of Subparagraph 1.10.5 and in Subparagraph 1.10.6 any amount held under a trustee writ or pursuant to a restraining order or injunction.

1.11 Discharge or Release of Bonds (Statutory reference: M.G.L. c.30, section 40) This Paragraph 1.11 applies to every contract awarded for the construction or repair of public buildings or other public works.

1.11.1 Bonds given to the commonwealth, any county, city, town or political subdivision to secure the performance of contracts for the construction or repair of public buildings or other public works may be discharged or released by the awarding authority, upon such terms as it deems expedient, after the expiration of one year from the time of completion, subject to Section 1.8, of the work contracted to be done; provided that no claim filed under said bond is pending, and provided further, that no such bonds shall be discharged or released prior to the expiration of all special guarantees provided for in the contract unless new bonds in substitution therefor specifically relating to the unexpired guarantees shall be taken.

ARTICLE 2 – WAGES AND EMPLOYMENT PRACTICES

2.1 Preference To Veterans and Citizens In Public Works; Rate of Wages: (Statutory reference: M.G.L. c. 149, Section 26) This Paragraph 2.1 applies to every contract or subcontract for the construction of public works by the Commonwealth or by a county, town or district.

2.1.1 In the employment of mechanics and apprentices, teamsters, chauffeurs and laborers, preference shall first be given to citizens of the Commonwealth who have been residents of the Commonwealth for at least six months at the commencement of their employment, who are veterans as defined in M.G.L. Chapter 4, Section 7, clause 43, and who are qualified to perform the work to which the employment relates and, within such preference, preference shall be given to service-disabled veterans; and secondly, to citizens of the Commonwealth generally who have been residents of the Commonwealth for at least six months at the commencement of their employment, and if they cannot be obtained in sufficient numbers, then to citizens of the United States, and every contract for such work shall contain a provision to this effect. Each county, town or district in the construction of public works, or persons contracting or subcontracting for such works, shall give preference to veterans and citizens who are residents of such county, town, authority or district, and within such preference, preference shall be given to service-disabled veterans.

2.1.2 The rate per hour of the wages paid to said mechanics and apprentices, teamsters, chauffeurs and laborers in the construction of public works shall not be less than the rate or rates of wages to be determined by the Commissioner as hereinafter provided; provided that the wages paid to laborers employed on said works shall not be less than those paid to laborers in the municipal service of the town or towns where said works are being constructed; provided further, that where the same public work is to be constructed in two or more towns, the wages paid to laborers shall not be less than those paid to laborers in the municipal town paying the highest rate; provided further, that if, in any of the towns where the works are to be constructed, a wage rate or wage rates have been established in certain trades and occupations by collective agreements or understandings in the private construction industry between organized labor and employers, the rate or rates to be paid on said works shall not be less than the rates so established; provided further, that in towns where no such rate or rates have been established, the wages paid to mechanics, teamsters, chauffeurs and laborers on public works, shall not be less than the wages paid to the employees in the same trades and occupations by private employers engaged in the construction industry. This section shall also apply to regular employees of the Commonwealth or a county, town, authority or district, when such employees are employed in the construction, addition to or alteration of public buildings for which special appropriations of more than one thousand dollars are provided. Payments by employers to health and welfare plans, pension plans and supplementary unemployment benefit plans under collective bargaining agreements or understandings between organized labor and employers shall be included for the purpose of establishing minimum wage rates as herein provided.

2.2 List of Jobs; Classifications; Determination of Rate of Wages; Schedule: (Statutory reference: M.G.L. Chapter 149, Section 27) This Paragraph 2.2. applies to every contract or subcontract for the construction of public works by the Commonwealth, or by a county, town or district.

2.2.1 The commissioner shall prepare, for the use of such public officials or public bodies whose duty it shall be to cause public works to be constructed, a list of the several jobs usually performed on various types of public works upon which mechanics and apprentices, teamsters, chauffeurs and laborers are employed, including the transportation of gravel or fill to the site of said public works or the removal of surplus gravel or fill from such site. The commissioner shall classify said jobs, and he may revise such classification from time to time, as he may deem advisable. Prior to awarding a contract for the construction of public works, said public official or public body shall submit to the commissioner a list of the jobs upon which mechanics and apprentices, teamsters, chauffeurs and laborers are to be employed, and shall request the commissioner to determine the rate of wages to be paid on each job. Each year after the awarding of the contract, the public official or public body shall submit to the commissioner a list of the jobs upon which mechanics and apprentices and laborers are to be employed and shall request that the commissioner update the determination of the rate of wages to be paid on each job. The general contractor shall annually obtain updated rates from the public official or public body and no contractor or subcontractor shall pay less than the rates so established. Said rates shall apply to all persons engaged in transporting gravel or fill to the site of said public works or removing gravel or fill from such site,

regardless of whether such persons are employed by a contractor or subcontractor or are independent contractors or owner-operators. The commissioner, subject to the provisions of Section 2.1, shall proceed forthwith to determine the same, and shall furnish said official or public body with a schedule of such rate or rates of wages as soon as said determination shall have been made. In advertising or calling for bids for said works, the awarding official or public body shall incorporate said schedule in the advertisement or call for bids by an appropriate reference thereto, and shall furnish a copy of said schedule, without cost, to any person requesting the same. Said schedule shall be made a part of the contract for said works and shall continue to be the minimum rate or rates of wages for said employees during the life of the contract. Any person engaged in the construction of said works shall cause a legible copy of said schedule and subsequent updates to be kept posted in a conspicuous place at the site of said works during the life of the contract. An apprentice performing work on a project subject to this section shall maintain in his possession an apprentice identification card issued pursuant to section M.G.L. Chapter 23, Section 11W. The aforesaid rates of wages in the schedule of wage rates shall include payments by employers to health and welfare plans, pension plans and supplementary unemployment benefit plans as provided in said Section 2.1, and such payments shall be considered as payments to persons under this section performing work as herein provided. Any employer engaged in the construction of such works who does not make payments to a health and welfare plan, a pension plan and a supplementary unemployment benefit plan, where such payments are included in said rates of wages, shall pay the amount of said payments directly to each employee engaged in said construction. Whoever shall pay less than said rate or rates of wages, including payments to health and welfare funds and pension funds, or the equivalent payment in wages, on said works to any person performing work within classifications as determined by the commissioner, and whoever, for himself, or as representative, agent or officer of another, shall take or receive for his own use or the use of any other person, as a rebate, refund or gratuity, or in any other guise, any part or portion of the wages, including payments to health and welfare funds and pension funds, or the equivalent payment in wages, paid to any such person for work done or service rendered on said public works, shall have violated this section and shall be punished or shall be subject to a civil citation or order as provided in M.G.L. Chapter 149, Section 27C. The president and treasurer of a corporation and any officers or agents having the management of such corporation shall also be deemed to be employers of the employees of any corporation within the meaning of Sections 2.1 to 2.3, inclusive.
Offers of restitution or payment of restitution shall not be considered in imposing such punishment.

2.2.2 When an investigation by the attorney general's office reveals that a contractor or subcontractor has violated this section by failing to pay said rate or rates of wages, including payments to health and welfare funds and pension funds, or the equivalent payment in wages, on said works to any person performing work within classifications as determined by the commissioner, or that a contractor or subcontractor has, for himself, or as representative, agent or officer of another, taken or received for his own use or the use of any other person, as a rebate, refund or gratuity, or in any other guise, any portion of the wages, including payments to health and welfare funds and pension funds, or the equivalent payment in wages, paid to any such person for work done or service rendered on said public works, the attorney general may, upon written

notice to the contractor or subcontractor and the sureties of the contractor or subcontractor, and after a hearing thereon, order work halted on the part of the contract on which such wage violations occurred, until the defaulting contractor or subcontractor has filed with the attorney general's office a bond in the amount of such penal sum as the attorney general shall determine, conditioned upon payment of said rate or rates of wages, including payments to health and welfare funds and pension funds, or the equivalent payment in wages, on said works to any person performing work within classifications as determined by the commissioner.
An employee claiming to be aggrieved by a violation of this section may, 90 days after the filing of a complaint with the attorney general, or sooner if the attorney general assents in writing, and within 3 years after the violation, institute and prosecute in his own name and on his own behalf, or for himself and for others similarly situated, a civil action for injunctive relief, for any damages incurred, and for any lost wages and other benefits. An employee so aggrieved who prevails in such an action shall be awarded treble damages, as liquidated damages, for any lost wages and other benefits and shall also be awarded the costs of the litigation and reasonable attorneys' fees.

2.3 Employment Records To Be Kept By Contractor, Subcontractors; Statement of Compliance: (Statutory reference: M.G.L. c. 149, Section 27B) This Paragraph 2.3 applies to every contract or subcontract for the construction of public works by the Commonwealth, or by a county, town or district.

Every Contractor, Subcontractor or public body engaged in said public works to which Paragraph 2.3 of these Supplementary General Conditions applies shall keep a true and accurate records of all mechanics and apprentices, teamsters, chauffeurs and laborers employed thereon, showing the name, address and occupational classification of each such employee on said works, and hours worked by, and wages paid to, each such employee, and shall promptly furnish to the Attorney General or his representative, upon his request, a copy of said record, signed by the employer or his authorized agent under the penalties of perjury. For every week in which an apprentice is employed by a contractor, subcontractor or public body subject to this section, a photocopy of the apprentice’s apprentice identification card, issued pursuant to M.G.L. Chapter 23, Section 11W, shall be attached to the records submitted under this section. Such records shall be open to inspection by any authorized representative of the department at any reasonable time, and as often as may be necessary. Every contractor and subcontractor required to keep such a record shall submit a copy of said record to the awarding authority directly and on a weekly basis.

Each such Contractor, Subcontractor or public body shall preserve its payroll records for a period of three years from the date of completion of the contract.

Each such Contractor, Subcontractor or public body shall furnish to the awarding authority directly within fifteen days after completion of its portion of the work a statement, executed by the Contractor, Subcontractor, or public body who supervises the payment of wages, in the following form.

STATEMENT OF COMPLIANCE

I, _____
(Name of signatory party) (Title)

do hereby state:

That I pay or supervise the payment of the persons employed by

_____
(Contractor, Subcontractor or public body)

on the _____ and that all mechanics
(building or project)

and apprentices, teamsters, chauffeurs and laborers employed on said project have been paid in accordance with wages determined under the provisions of sections twenty-six and twenty-seven of chapter one hundred and forty-nine of the General Laws.

Signature _____

Title _____

The above-mentioned copies of payroll records and statements of compliance shall be available for inspection by any interested party filing a written request to the awarding authority for such inspection and copying.

2.4 Wages Paid to Operators of Trucks and Other Equipment: (Statutory reference: M.G.L. c. 149, Section 27F) This Paragraph 2.4 applies to every contract for the construction of public works by the Commonwealth, or by a county, city, town or district.

No agreement of lease, rental or other arrangement, and no order or requisition under which a truck or any automotive or other vehicle or equipment is to be engaged in public works by the commonwealth or by a county, city, town or district, shall be entered into or given by any public official or public body unless said agreement, order or requisition contains a stipulation requiring prescribed rates of wages, as determined by the commissioner, to be paid to the operators of said trucks, vehicles or equipment. Any such agreement, order or requisition which does not contain said stipulation shall be invalid, and no payment shall be made thereunder. Said rates of wages shall be requested of said commissioner by said public official or public body, and shall be furnished by the commissioner in a schedule containing the classifications of jobs, and the rate of wages to be paid for each job. Said rates of wages shall include payments to health and welfare plans, or, if no such plan is in effect between employers and employees, the amount of such payments shall be paid directly to said operators.

Whoever pays less than said rates of wages, including payments to health and welfare funds, or the equivalent in wages, on said works, and whoever accepts for his own use, or for the use of any other person, as a rebate, gratuity or in any other guise, any part or portion of said wages or health and welfare funds, shall have violated this section and shall be punished or shall be subject to a civil citation or order as provided in M.G.L. Chapter 149, Section 27C.
An employee claiming to be aggrieved by a violation of this section may, 90 days after the filing of a complaint with the attorney general, or sooner if the attorney general assents in writing, and within 3 years after the violation, institute and prosecute in his own name and on his own behalf, or for himself and for others similarly situated, a civil action for injunctive relief, for any damages incurred, and for any lost wages and other benefits. An employee so aggrieved who prevails in such an action shall be awarded treble damages, as liquidated damages, for any lost wages and other benefits and shall also be awarded the costs of the litigation and reasonable attorneys' fees.

2.5 Reserve Police Officers: (Statutory reference: M.G.L. Chapter 149, Section 34B) This Paragraph 2.5 applies to every contract for the construction, alteration, maintenance, repair or demolition of, or addition to, any public works for the Commonwealth or any political subdivision thereof.

The contractor shall pay to any reserve police officer employed by him in any city or town the prevailing rate of wages paid to regular police officers in such city or town.

2.6 Eight-hour Day, etc.: (Statutory reference: M.G.L. Chapter 149, Sections 30, 34, and 34A) This Paragraph 2.6 applies only to contracts which are subject to the provisions of the aforesaid sections of the Massachusetts General Laws.

No laborer, worker, mechanic, foreman or inspector working within this Commonwealth in the employ of the Contractor, Subcontractor or other person doing or contracting to do the whole or part of the work contemplated by the contract, shall be required or permitted to work more than eight hours in any one day or more than forty-eight hours in any one week, or more than six days in any one week, except in cases of extraordinary emergency.

2.7 Lodging, etc.: (Statutory reference: M.G.L. Chapter 149, Section 25) This paragraph 2.7 applies to every contract for the doing of public work with the Commonwealth, a county, city or town, or with a department, board, commission, or officer acting therefor.

Every employee under this contract shall lodge, board and trade where and with whom he elects, and neither the Contractor nor his agents or employees shall, either directly or indirectly, require as a condition of the employment of any person that the employee shall lodge, board or trade at a particular place or with a particular person.

2.8 Access to Contractor's Records: (Executive Order No. 195) This Paragraph 2.8 applies to every contract for the purchase of services or materials by any agency, bureau, board, commission, institution, or department of the Commonwealth or a municipal contract funded, in whole or in part, by the Commonwealth.

The Governor or his designee, the secretary of administration and finance, and the state auditor or his designee shall have the right at reasonable times and upon reasonable notice to examine the books, records and other compilations of data of the Contractor which pertain to the performance and requirements of this contract.

2.9 Worker's Compensation Insurance: (Statutory reference: M.G.L. chapter 149, Section 34) This Paragraph 2.9 applies to every contract for the construction, alteration, maintenance, repair or demolition of, or addition to, any public building or other public works for the Commonwealth or any political subdivision thereof.

The Contractor shall, before commencing performance of the contract, provide by insurance for the payment of and the furnishing of other benefits under M.G.L. Chapter 152 to all persons to be employed under the contract, and the Contractor shall continue such insurance in full force and effect during the term of the contract. Sufficient proof of compliance with this Paragraph 2.9 must be furnished at the time of execution of this contract. Failure to provide and continue in force such insurance as aforesaid shall be deemed a material breach of the contract and shall operate as an immediate termination thereof. No cancellation of such insurance, whether by the insurer or by the insured, shall be valid unless written notice thereof is given by the party proposing cancellation to other party and to the awarding authority at least fifteen days prior to the intended effective date thereof, which date shall be expressed in said notice.

Notice of cancellation sent by the party proposing cancellation by registered mail, postage prepaid, with a return receipt of the addressee requested, shall be a sufficient notice. An affidavit of any officer, agent or employee of the insurer or of the insured, as the case may be, duly authorized for the purpose, that he has so sent such notice addressed as aforesaid shall be prima facie evidence of the sending thereof as aforesaid. This section shall apply to the legal representative, trustee in bankruptcy, receiver, assignee, trustee and the successor in interest of any such contractor. The superior court shall have jurisdiction in equity to enforce this section. Whoever violates any provision of this section shall be punished by a fine of not more than one hundred dollars or by imprisonment for six months, or both; and, in addition, any contractor who violates any provision of this section shall be prohibited from contracting, directly or indirectly, with the commonwealth or any political subdivision thereof, for the construction, alteration, demolition, maintenance or repair of, or addition to, any public works or public building for a period of two years from the date of conviction of said violation.

ARTICLE 3 – CONTRACTOR'S ACCOUNTING METHOD REQUIREMENTS

3.1 (Statutory reference: M.G.L. Chapter 30, Section 39R)
This Article 3 applies to "Contracts" and "Contractors", as defined in Subparagraph 3.1.1 and 3.1.2, below.

3.1.1 "Contractor" means any person, corporation, partnership, joint venture, sole proprietorship, or other entity awarded a contract pursuant to Sections 38A 1/2 to 38O, inclusive, of Chapter 7, Section 39M of Chapter 30, Sections 44A-44J, inclusive, of Chapter 149, or Section 11C of Chapter 25A which is for an amount or estimated amount that exceeds the dollar amount set forth in M.G.L. Chapter 30, Section 39R.

3.1.2 "Contract" means any contract awarded or executed pursuant to Sections 38A 1/2 to 38O, inclusive, of Chapter 7, Section 39M of Chapter 30, Sections 44A-44J, inclusive, of Chapter 149, or Section 11C of Chapter 25A which is for an amount or estimated amount that exceeds the dollar amount set forth in M.G.L. Chapter 30, Section 39R.

3.1.3 "Records" means books of original entry, accounts, checks, bank statements and all other banking documents, correspondence, memoranda, invoices, computer printouts, tapes, discs, papers and other documents or transcribed information of any type, whether expressed in ordinary or machine language.

3.1.4 "Independent Certified Public Accountant" means a person duly registered in good standing and entitled to practice as a certified public accountant under the laws of the place of his residence or principal office who is in fact independent. In determining whether an accountant is independent with respect to a particular person, appropriate consideration should be given to all relationships between the accountant and that person or any affiliate thereof. Determination of an accountant's independence shall not be confined to the relationships existing in connection with the filing of reports with the awarding authority.

3.1.5 "Audit", when used in regard to financial statements, means an examination of records by an independent certified public accountant in accordance with generally accepting accounting principles and auditing standards for the purpose of expressing a *certified* opinion thereon, or, in the alternative, a qualified opinion or a declination to express an opinion for stated reasons.

3.1.6 "Accountant's Report", when used in regard to financial statements, means a document in which an independent certified public accountant indicates the scope of the audit which he has made and sets his opinion regarding the financial statements taken as a whole with a listing of noted exceptions and qualifications, or an assertion to the effect that an overall opinion cannot be expressed. When an overall opinion cannot be expressed, the reasons therefor shall be stated. An accountant's report shall include as a part thereof a signed statement by the responsible corporate officer attesting that management has fully disclosed all material facts to the independent certified

public accountant, and that the auditing financial statement is a true and complete statement of the financial condition of the Contractor.

3.1.7 "Management", when used herein, means the chief executive officers, partners, principals or other person or persons primarily responsible for the financial and operational policies and practices of the Contractor.

3.1.8 Accounting terms, unless-otherwise defined herein, shall have a meaning in accordance with generally accepted accounting principles and auditing standards.

3.2 Subparagraph 3.1.2 hereof notwithstanding, every agreement or contract awarded or executed pursuant to to Sections 38A 1/2 to 38O, inclusive, of Chapter 7, Section 39M of Chapter 30, Sections 44A-44J, inclusive, of Chapter 149, or Section 11C of Chapter 25A, shall provide that:

3.2.1 The Contractor shall make, and keep for at least six years after final payment, books, records, and accounts which in reasonable detail accurately and fairly reflect the transactions and dispositions of the Contractor; and

3.2.2 Until the expiration of six years after final payment, the awarding authority, office of inspector general, and the commissioner of capital asset management and maintenance shall have the right to examine any books, documents, papers or records of the Contractor or his Subcontractors that directly pertain to, and involve transactions relating to, the Contractor or his Subcontractors; and

3.2.3 If the agreement is a contract as defined herein, the Contractor shall describe any change in the method of maintaining records or recording transactions which materially affect any statements filed with the awarding authority, including in his description the date of the change and reasons therefor, and shall accompany said description with a letter from the Contractor's independent certified public accountant approving or otherwise commenting on the changes.

3.2.4 If the agreement is a contract as defined herein, the Contractor has filed a statement of management on internal accounting controls as set forth in Paragraph 3.3 below prior to the execution of the contract.

3.2.5 If the agreement is a contract as defined herein, the Contractor has filed prior to the execution of the contracts and will continue to file annually, an audited financial statement for the most recent completed fiscal year as set forth in Paragraph 3.5 below.

3.3 Every Contractor awarded a contract shall file with the awarding authority a statement of management as to whether the system of internal accounting controls of the Contractor and its subsidiaries reasonably assures that:

3.3.1 transactions are executed in accordance with management's general and specific authorization:

3.3.2 transactions are recorded as necessary

(i) to permit preparation of financial statements in conformity with generally accepted accounting principles, and

(ii) to maintain accountability for assets;

3.3.3 Access to assets is permitted only in accordance with management's general or specific authorization; and

3.3.4 The recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action was taken with respect to any difference.

3.4 Every Contractor awarded a contract shall also file with the awarding authority a statement prepared and signed by an independent certified public accountant, stating that he/she has examined the statement of management on internal accounting controls, and expressing an opinion as to:

3.4.1 Whether the representations of management in response to this paragraph and Paragraph 3.2 above are consistent with the result of management's evaluation of the system of internal accounting controls; and

3.4.2 Whether such representations of management are, in addition, reasonable with respect to transactions and assets in amounts which would be material when measured in relation to the applicant's financial statements.

3.5 Every Contractor awarded a contract by the Commonwealth or by any political subdivision thereof shall annually file with the commissioner of capital asset management and maintenance during the term of the contract a financial statement prepared by an independent certified public accountant on the basis of an audit by such accountant. The final statement filed shall include the date of final payment. All statements shall be accompanied by an accountant's report.

ARTICLE 4 – MISCELLANEOUS

4.1 Weather Protection: This Paragraph 4.1 applies to every contract subject to M.G.L. Chapter 149, Section 44A.

4.1.1 The Contractor shall install weather protection and provide adequate heat in the protected area from November 1 to March 31, as required by M.G.L. Chapter 149 Section 44F(1).

4.2 Form for Sub-contract: This Paragraph 4.2 applies to every contract subject to M.G.L. Chapter 149 Section 44A.

4.2.1 The Contractor when sub-contracting with sub-bidders filed pursuant to M.G.L. Chapter 149, Section 44F shall use the form for sub-contract in Chapter 149 Section 44F(4)(c).

4.3 Foreign Corporations: This Paragraph 4.3 applies to every contract with the Commonwealth, a county, city, town, district, board, commission, or other public body for the construction, reconstruction, alteration, remodeling, repair, or demolition of any public building or other public works.

4.3.1 The Contractor, if a foreign corporation, shall comply with M.G.L. Chapter 30, Section 39L.

4.4 Shoring: (Statutory reference: M.G.L. Chapter 149, Section 129A*).* This Paragraph 4.4 applies to every construction project carried on by any city, town, county, or other subdivision of the Commonwealth in which a trench is to be dug to a depth of five feet or more, except a trench for laying of water pipes dug to a depth of six and one-half feet which will be open less than 48 hours, and except for digging of graves.

4.4.1 Such trenches shall be shored and braced in conformity with rules and regulations for the prevention of accidents in construction operations, as adopted and enforced by the Attorney General.

4.5 Certification of Compliance with Tax Laws: (Statutory reference: M.G.L. Chapter 62C, Section 49A) This Paragraph 4.5 applies to contracts for goods or services furnished by any department, board, commission, division, authority, district or other agency of the Commonwealth or any subdivision of the Commonwealth, including a city, town or district.

4.5.1 By executing this contract, the Contractor certifies, under penalties of perjury, that to the best of his information, knowledge and belief he has complied with all laws of the Commonwealth relating to taxes.

4.6 Verification of Construction Debris Disposal: (Worcester Revised Ordinances Chapter 8, Section 7) This paragraph 4.6 shall apply to every contract entered into by the City of Worcester for the demolition, renovation, rehabilitation, or alteration of a building or structure.

a. In furtherance of the requirements set forth in G.L. c.40, §54, and §114.1.3 of the State Building Code, the building commissioner shall require any person who obtains a permit for the demolition, renovation, rehabilitation, or alteration of a building or structure to provide verification that the debris resulting from such activities was disposed of at the licensed solid waste facility named in conjunction with the permit application.

b. The verification required under sub-section (a), above, shall consist of the following:

1) a dated receipt, signed by the owner/operator of the licensed solid waste disposal facility where the debris was deposited.

2) the receipt shall contain a description of the debris disposed of, and its weight, or volume.

3) the permit holder shall also provide the building commissioner with an affidavit that the receipt submitted is true and accurate to the best of the permit holder's knowledge.

4) if the permit holder cannot dispose of the debris at the location indicated, it shall be the permit holder's obligation to obtain an amendment to the permit reflecting the new disposal location. The building commissioner shall be so notified, and the permit amended, prior to the disposal of the debris at the new disposal location.

c. This section shall not apply to the construction of a new building or structure.

4.7 Responsible Employer Ordinance: (Worcester Revised Ordinances, Chapter 2, Section 35) This paragraph 4.7 shall apply to every contract entered into by the City of Worcester for the construction, reconstruction, installation, demolition, maintenance or repair of any building, where the contract amount is more than one hundred thousand dollars.

a. The city council hereby finds and determines that taxpayer money is most efficiently and productively spent by awarding construction contracts to firms that include and enforce provisions requiring compliance with state laws governing the payment of prevailing wages, the provision of workers compensation coverage, and the proper classification of individuals as employees and not as independent contractors, as well as provisions concerning health insurance coverage and state-certified apprenticeship programs. The city council hereby further finds and determines that it is appropriate for it to exercise its entrepreneurial discretion by requiring firms that are awarded such contracts to comply with this ordinance because failure to comply is injurious to the life, health, and happiness of individuals employed by such firms and is deleterious to the quality of life in the city where most of such individuals reside.

b. Every contract awarded by the city under G.L. c.149 and G.L. 149A shall be deemed to incorporate by reference the provisions of sub-parts (c)(1) through (8) of together with the provisions of subsections (d) and (e) of this section. Any person, company or corporation shall acknowledge, in writing, receipt of said requirements with their bid or proposal.

c. All bidders or proposers and all subcontractors and trade contractors, including subcontractors that are not subject to G.L. c.149, Section 44F, under the bidder for projects subject to G.L. c.149, Section 44A(2), and proposers under G.L. c. 149A, shall as a condition for bidding or subcontracting verify under oath and in writing at the time of bidding or subcontracting verify under oath and in writing at the time of budding or submittal in response to and RFP or in any event prior to entering into a subcontract at any tier, that they comply with the following conditions for bidding or subcontracting and, for the duration of the project, shall comply with the following obligations:

1) The bidder or proposer and all trade contractors and subcontractors under the bidder or proposer must comply with the obligations established under G.L. c. 149 to pay the appropriate lawful prevailing wage rates to their employees.

The bidder or proposer and all trade contractors and subcontractors under the bidder or proposer must at a the time of bidding maintain or participate in a bona fide apprentice training program as defined by G.L. c.23, Sections 11H and 11I for each apprenticable trade or occupation represented in their workforce that is approved by the Division of Apprentice Standards of the Department of Labor and Workforce Development, regardless of whether or not the program qualifies as an employee welfare benefit plan under ERISA, and must register all apprentices with the Division and abide by the apprentice to journeyman ratio for each trade prescribed therein in the performance of any work on the project. This provision does not require the program to be an ERISA plan; the program need only have been approved by the Division of Apprentice Standards. All general bidders or proposers and all trade contractors and sub-bidders at every tier must submit with its bid or proposal an original, stamped Sponsor Verification letter from the Commonwealth of Massachusetts, Department of Labor and Workforce Development – Division Apprentice Standards, issued within the past 90 days, evidencing that at the time of submitting a bid or proposal, the bidder or proposer is currently an Approved Sponsor of Apprentices. Any bid or proposal submitted without the above documentation shall be rejected; **{COMPLIANCE WITH THE APPRENTICE TRAINING PROVISION OF THE RESPONSIBLE EMPLOYER ORDINANCE IS CURRENTLY SUSPENDED}**

2) The bidder or proposer and all trade contractors and subcontractors under the bidder or proposer must maintain appropriate industrial accident insurance coverage for all the employees on the project in accordance with G.L. c. 152;

3) The bidder or proposer and all trade contractors and subcontractors under the bidder must properly classify employees as employees rather than independent contractors and treat them accordingly for purposes of workers' compensation insurance coverage, unemployment taxes, social security taxes and income tax withholding. (G.L. c.149, Section 148B on employee classification);

4) The bidder or proposer and all trade contractors and subcontractors under the bidder or proposer must at the time of bidding certify that, at the time employees begin work at the worksite, all employees will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration, and shall ensure that all employees working at the worksite possess such qualifications at all times throughout the duration of their work on the project and furnish documentation of successful completion of the course;

5) The bidder or proposer and all trade contractors and subcontractors under the bidder or proposer must be in compliance with the health and hospitalization requirements of the Massachusetts Health Care Reform law established by Chapter 58 of the Acts of 2006, as amended, and regulations promulgated under that statute by the Commonwealth Health Insurance Connector Authority.

6) The bidder or proposer and all trade contractors and subcontractors under the bidder or proposer must make arrangements to ensure that each employee of every contractor entering or leaving the project individually completes the appropriate entries in a daily sign-in/out log. The sign-in/out log shall include: the location of the project; current date; printed employee name; signed employee name; and the time of each entry or exiting. The log shall contain a prominent notice that employees are entitled under state law to receive the prevailing wage rate for their work on the project. Such sign-in/out logs shall be provided to the City on a daily basis.

7) The bidder or proposer and all trade contractors and subcontractors under the bidder or proposer, prior to bidding or, if not subject to bidding requirements, prior to performing any work on the project, shall sign under oath and provide to the City a certification that they are not debarred or otherwise prevented from bidding for or performing work on a public project in the Commonwealth of Massachusetts or in the City.

d. A proposal or bid submitted by any general bidder or by any trade contractor or subcontractor under the general bidder or proposer that does not comply with any of the foregoing conditions for bidding shall be rejected, and no subcontract for work outside the scope of G.L. c.149, Section 44F shall be awarded to a subcontractor that does not comply with the foregoing conditions.

e. All bidders or proposers and all trade contractors and subcontractors under the bidder or proposer who are awarded or who otherwise obtain contracts on the projects subject to G.L. c.149, Section 44A(2) or c.149A, shall comply with each of the obligations set forth in this Section 4.7 for the entire duration of their work on the project, and an officer of each bidder or subcontractor under the bidder shall certify under oath and in writing on a weekly basis that they are in compliance with such obligations.

f. Any proposer, bidder, trade contractor or subcontractor under the bidder or proposer who fails to comply with any one of the obligations set forth in this Section 4.7 for any period of time shall be, at the sole discretion of the City, subject to one or more of the following sanctions:
   1) cessation of work on the project until compliance is obtained;
   2) withholding of payment due under any contract or subcontract until compliance is obtained;
   3) permanent removal from any further work on the project;
   4) liquidated damages payable to the City in the amount of 5% of the dollar value of the contract.

g. In addition to the sanctions outlined in subsection (f) above, a proposer, general bidder or contractor shall be equally liable for the violations of its subcontractor with the exception of violations arising from work performed pursuant to subcontracts that are subject to G.L. c.149, Section 44F. Any contractor or subcontractor that has been determined by the City or by any court or agency to have violated any of the obligations set forth in this Section 4.7 shall be barred from performing any work on any future projects for six months for a first violation, three years for a second violation and permanently for a third violation.

4.8 Regulation of Construction Noise: (Worcester Revised Ordinances, Chapter 8, Section 34). The paragraph 4.8 shall apply to anyone operating powered construction equipment delivering construction equipment and/or supplies at any construction site or project within the city of Worcester.

a. It shall be unlawful for any person, firm, corporation, partnership, or other entity to operate powered construction equipment or to build, erect, construct, demolish, alter, repair, excavate or engage in hoisting, grading, site work, including tree and brush removal, dredging or pneumatic hammering, or to deliver construction equipment and/or supplies to the site on any building, road, tower, parking lot, machine, pipe, sewer, sidewalk, or any other construction project (hereafter collectively the “construction project”), except between the hours of 7:00 a.m. and 9:00 p.m. on weekdays and Saturday, except for “emergency work” which is performed in the interest of public safety or welfare and for which a permit has been issued by the commissioner of public works and parks or the commissioner of inspectional services.

It shall be unlawful for any person, firm, corporation, partnership, or other entity to engage in a construction project activity on Sundays or legal holidays without a permit from the police chief issued pursuant to G.L. c. 136, Section 7 or 15 and a permit issued by the commissioner of inspectional services hereunder.

b. Emergency work permits may be issued in:

1) cases of urgent necessity and for the interests of health, safety and convenience of the public. The commissioner of inspectional services shall whether the reasons given for the urgent necessity are valid and reasonable, and whether the health, safety and convenience of the public will be protected or better served by granting the permit requested and whether the manner and amount of loss or inconvenience to the party in interest imposes a significant hardship; or,

2) cases where, because the location and nature of the work, the noise caused by said work will not be heard by anyone not working on the project. The commissioner of inspectional services shall consider whether supplying machinery and/or materials to the construction project site will cause unreasonable noise along the routes to the construction project site, and whether such activity will impact residential neighborhoods, and shall not grant any emergency work permit unless unreasonable noise in residential areas will be prevented.

c. Emergency work permits may be issued to the general contractor on a blanket basis that applies to all of the contractors working on the job, or may be issued to specific contractors on the construction project, at the discretion of the Commissioner. Emergency work permits may be issued for not more than one week at a time, and may be renewed for additional one week periods at the discretion of the Commissioner.

d. Prior to issuing or reissuing said emergency work permit, the commissioner of inspectional services shall review the work being conducted and all attendant circumstances, and shall prescribe whatever limitations possible to minimize the generation of noise, and to minimize the impact of noise on the neighbors to the construction project.

e. Emergency repair work performed by the Department of Public Works and/or any public utility is exempt from this section.

f. The fee for each such Emergency work permits issued under this section shall be set in accordance with Chapter 2, § 24 of the City of Worcester Revised Ordinances of 2008.

g. On any project for the construction, reconstruction, installation, demolition, maintenance or repair of any building, or public work, to be funded in whole or in part by city funds, or funds which, in accordance with a federal or state grant, program, or otherwise, the city expends or administers, or any such project to which the city is a signatory to the contract

therefor, the provisions of this section shall apply and the same shall be referred in every invitation to bid for such project and, the following paragraphs shall be contained in every resulting contract therefrom:

> "It shall be a material breach of this contract if the contractor and each subcontractor shall not at all times adhere to the provisions of § 34 of chapter eight of the Revised Ordinances of the city, by limiting their on-site, noise producing construction and related work to the hours specified by the Ordinance.
>
> A waiver from the above requirements may, in certain circumstances, be granted in accordance with subsections (b), (c) and (d) of § 34 of chapter eight of the Revised Ordinances of the city."

h. The commissioner of inspectional services shall have the authority to adopt any rules and regulations he or she deems necessary to implement this section.

i. Nothing in this section shall be deemed to prevent an individual from performing work on his or her own property, so long as the work is being done by the owner of the property or by direct relative(s) of the owner, and said work is not being done for profit.

j. This section may be enforced by the commissioner of inspectional services, the building commissioner, the chief of police or their subordinates.

k. Any violation of this section by any person, firm, corporation, partnership, or other entity, shall be individually punished with a fine of $100.00. Each day upon which a violation of this section occurs shall be considered a separate violation. Employers shall be deemed the violator for violations committed by their employees.

4.9 Regulation of Excessive and Unreasonable Noise: (Worcester Revised Ordinances, Chapter 9, Section 1A(e)(9) This paragraph 4.9 shall apply to anyone operating powered construction equipment delivering construction equipment and/or supplies at any construction site or project within the city of Worcester.

a. No person shall operate any powered construction equipment or build, erect, construct, demolish, alter, repair, excavate or engage in hoisting, grading, site work, including tree and brush removal, dredging or pneumatic hammering, or deliver construction equipment and/or supplies to the site on any building, road, tower, parking lot, machine, pipe, sewer, sidewalk, or any other construction project, except between the hours of 7:00 a.m. and 9:00 p.m. on weekdays and Saturday, and between the hours of 9:00 a.m. and 7:00 p.m. on Sundays, except for work performed by a public service or municipal utility department or "emergency work" performed with the express written permission of the commissioner of inspectional services or the commissioner of public works and parks. Emergency work shall be limited to such work that is clearly essential to respond to a sudden and unexpected

threat to public health or public safety. Emergency work permission may be granted to a general or sub-contractor on a blanket basis governing all persons working on a specified portion of a particular job. Emergency work permission may be granted for not more than one week at a time, and may be renewed for additional one week periods at the discretion of the commissioner who granted the initial permission.

END OF SECTION

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CITY OF WORCESTER

FORM FOR GENERAL BID

BIDDER'S NAME _____

This bid must be accompanied by a deposit in the form of cash, or bid bond, or a certified check, treasurer's check, or cashier's check, payable to the City of Worcester (hereinafter referred to as the "Owner", or the "Awarding Authority") in the amount of five (5) percent of the value of the bid. No other form of bid security will be accepted.

By submitting this bid the undersigned represents to the Owner that it has examined and understands the Advertisement for Bids, Instructions to Bidders, contract forms, Conditions of the Contract (General and Supplementary), Drawings, Specifications and all other Contract Documents and has examined the site, as defined therein, and that this bid is made with distinct reference and relation to all said Contract Documents; but the undersigned declares that in regard to the conditions affecting the work to be done and the labor and materials needed, this bid is based solely on its own investigation and research and not in reliance upon any drawings, surveys, measurements, dimensions, calculations, estimates, or other tests or representations of any employee, officer, agent or consultant of the Owner. By submitting this bid, the undersigned agrees that it shall be subject to the jurisdiction of the courts of the Commonwealth of Massachusetts with respect to any actions arising out of or related to this bid or any contract that may be entered into based upon this bid, and that any such actions commenced by the undersigned shall be commenced in the courts of the Commonwealth of Massachusetts.

A bidder wishing to amend this bid after transmittal to the Owner may do so only by withdrawing this bid and resubmitting another bid prior to the time for opening bids.

To the Awarding Authority: The City of Worcester, Massachusetts

A. The undersigned proposes to furnish all labor and materials required for the **HANDICAP ACCESSIBILIY UPGRADES FOR CHALLENGE & REACH ACADEMY, GERARD CREAMER SCHOOL, LINCOLN ELEMENTARY SCHOOL, THORNDYKE ROAD ELEMENTARY SCHOOL**, in accordance with the accompanying Drawings, Specifications and Addenda, prepared by Mount Vernon Group Architects, Inc., 178 Albion Street, Suite 240, Wakefield, Ma 01880, Department of Public Facilities, 50 Officer Manny Familia Drive, Worcester, MA 01605, for the contract price specified below, subject to additions or deductions according to the terms of the Plans and Specifications.

B. This Bid includes Addenda numbered _____.

C. The Proposed Contract Price is (Total of Items 1 and 2):

_____Dollars ($_____)

D. Item 1: The work of the General Bidder, being all work other than that covered by Item 2:

_____Dollars ($_____)

E. Unit Prices:

As authorized by the Owner, should the quantities of certain classes of work to be increased or decreased, as described below, the Unit Prices listed below shall be the basis of payment to the General Contractor, or credit to the Owner, for such increase or decrease in the Work. The Unit Prices shall represent the exact net amount, per unit, to be paid to the General Contractor, in the case of additions. No additional adjustment shall be allowed for overhead, profit, insurance, or other direct or indirect expenses of the General Contractor. No additional adjustments shall be allowed for over excavation, or other related work, without prior written approval of the Owner. The Owner reserves the right to negotiate total additive or deductive change value for any line items which deviate more than 25% from the stated quantities below:

Lincoln Elementary School:

Unit Price No. 1: Excavation, stockpiling, and removal of unsuitable soils at the new ADA walkways, sidewalk, and utilities and replace with imported suitable backfill materials that is more than or less than 250 cubic yards at

$ _____ per cubic yard, for a total of _____

_____ ($_____).

Unit Price No. 2: Excavation, stockpiling, and removal of unsuitable soils at the building, retaining walls at footings and replace with imported structural infill compacted in place that is more than or less than 100 cubic yards at

$ _____ per cubic yard, for a total of _____

_____ ($_____).

Unit Price No. 3: Excavation, stockpiling, and removal of ledge and boulders measured at 2 cubic yards and larger at the new elevator pit and replace with imported structural infill compacted in place that is more than or less than 50 cubic yards at

$ _____ per cubic yard, for a total of _____

_____ ($_____).

Thorndyke Road Elementary School:

Unit Price No. 4: Excavation, stockpiling, and removal of unsuitable soils at the existing sloped walkway and replace with imported suitable backfill materials that is more than or less than 100 cubic yards at

$ _____ per cubic yard, for a total of _____

_____ ($_____).

Unit Price No. 5: Excavation, stockpiling, and removal of unsuitable soils at the new elevator pit and replace with imported structural infill compacted in place that is more than or less than 100 cubic yards at

$ _____ per cubic yard, for a total of _____

_____ ($_____).

F. Item 2: The work of Filed Sub-bidders. Fill in the name, sub-bid amount and bonding requirement of selected filed sub-bidders.

SUBTRADE SECTION	NAME OF SUB-BIDDER	SUB-BID AMOUNT	BONDS REQUIRED? "YES" OR "NO"
Section 04 20 00 - Unit Masonry including 04 21 11			
Section 05 50 00 – Metal Fabrications including 05 51 00, 05 52 13, and 05 55 16			
Section 07 25 00 – Weather Barriers including 07 27 26 and 07 92 00			

SUBTRADE SECTION	NAME OF SUB-BIDDER	SUB-BID AMOUNT	BONDS REQUIRED? "YES" OR "NO"
Section 09 30 00 – Tiling			
Section 09 51 13 – Acoustical Panel Ceilings			
Section 09 65 16 – Resilient Flooring including 09 65 13			
Section 09 91 13 – Painting			
Section 14 24 00 – Hydraulic Elevator including 14 24 01			
Section 21 00 00 – Fire Suppression			
Section 22 00 00 – Plumbing			
Section 23 00 00 - Heating, Ventilating and Air Conditioning			
Section 26 00 00 – Electrical including 27 05 00, 27 41 00, and 28 10 00			
TOTAL ITEM 2	$		

G. The undersigned agrees that the above named sub-bidders will be used for the work indicated at the amount stated, unless a substitution is made. The undersigned further agrees to pay the premiums of the performance and payment bonds furnished by sub-bidders as requested herein and that all the cost of such premium is included in the amount set forth in ITEM 1 of this bid.

H. The undersigned agrees that, if he is selected as a General Contractor, he will promptly confer with the Awarding Authority on the question of the sub-bidder(s); and that the Awarding Authority may substitute for any Sub-Bid listed above a Sub-Bid filed with the Awarding Authority by another sub-bidder for the sub-trade against whose standing and ability the undersigned makes no objection; and that the undersigned will use all such finally selected sub-bidder(s) at the amount named in their work as if they had been originally named in this general bid, the total contract price being adjusted to conform thereto.

I. The undersigned agrees that, if he is selected as General Contractor, he will within five (5) days, Saturdays, Sundays and legal holidays excluded, after presentation thereof by the Awarding Authority, execute a contract in accordance with the terms of this bid and furnish a performance bond and also a labor and materials or payment bond, each of a surety company qualified to do business under the laws of the Commonwealth of Massachusetts and satisfactory to the Awarding Authority and each in the sum of the contract price, the premiums for which are to be paid by the General Contractor and are included in the contract price.

J. The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work and that he will comply fully with all laws and regulations applicable to awards made subject to Section 44A of Chapter 149 of the Massachusetts General Laws.

K. The undersigned further certifies under penalties of perjury that this bid is in all respects bona-fide, fair and made without collusion or fraud with any other person. As used herein the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The undersigned further certifies under penalties of perjury that the said undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of Section Twenty-nine F of Chapter Twenty-nine, or any other applicable debarment provisions of any other Chapter of the Massachusetts General Laws or any rule or regulation promulgated there under.

L. The undersigned hereby certifies that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and that they will comply fully with all laws and regulations applicable to awards made subject to M.G.L. c.149 sec.44A-J.

Date	Print Name of Bidder
Social Security Number or Federal Identification Number	By _____ Name of Person Signing Bid and Title
Telephone Number	Business Street Address
Fax Number	City, State and ZIP Code

The Bidder shall fill in the following information about its business organization.

1. If the Bidder is a Corporation, indicate the state of incorporation.

President:	State of Incorporation:
Treasurer:	Secretary:
If a Foreign Corporation: (incorporated or organized under laws other than laws of the Commonwealth of Massachusetts)	Is the Corporation registered with the Secretary of State of Massachusetts? Yes _____ No _____
If the Bidder is selected for the work referred to above, it is required under Massachusetts General Laws, Chapter 30, Section 39L to furnish to the Awarding Authority a certificate of the Secretary of State stating that the Corporation has complied with Massachusetts General Laws, Chapter 181, Sections 3 and 5 and the date of such compliance.	

2. If the Bidder is a Partnership, give full names and addresses of all partners:

Name of Partner:	Residence Address:
Name of Partner:	Residence Address:
Name of Partner:	Residence Address:

3. If the Bidder is an Individual, give residential address if different from business address:

Name:	Residence Address:

4. If the Bidder is an Individual doing business under a Firm name:

Name of Firm:	Business Address:
Name of Individual:	Residence Address:

Other form of business organization:

M. The Bidder will give below the name and address of the Surety Company who will sign the bonds.

Name:	Address:

END OF SECTION

CITY OF WORCESTER

FORM FOR SUB—BID

SUB-TRADE: _____

NAME OF SUB-BIDDER: _____

This bid must be accompanied by a bid deposit in the form of cash, or a bid bond, or a certified check, treasurer's check, or cashier's check, payable to the City of Worcester (hereinafter referred to as the "Owner" or the "Awarding Authority") in the amount of five (5) percent of the value of the bid. No other form of bid security will be accepted.

By submitting this bid the undersigned represents to the Owner that it has examined and understands the Advertisement for Bids, Instructions to Bidders, Contract Forms, Conditions of the Contract (General and Supplementary), Drawings, Specifications and all other Contract Documents and has examined the site, as defined therein, and that this bid is made with distinct reference and relation to all said Contract Documents, but the undersigned declares that in regard to the conditions affecting the work to be done and the labor and materials needed, this bid is based solely on its own investigation and research and not in reliance upon any drawings, surveys, measurements, dimensions, calculations, estimates, or other tests or representations of any employee, officer, agent or consultant of the Owner. By submitting this bid, the undersigned agrees that it shall be subject to the jurisdiction of the courts of the Commonwealth of Massachusetts with respect to any actions arising out of or relating to this bid or any contract that may be entered into based upon this bid, and that any such actions commenced by the undersigned shall be commenced in the courts of the Commonwealth of Massachusetts.

A bidder wishing to amend this bid after transmittal to the Owner may do so only by withdrawing this bid and resubmitting another bid prior to the time for opening bids. See: General Bid Form

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To all General Bidders except those excluded:

A. The undersigned proposes to furnish all labor and materials required for completing the Work specified in Section(s) 220001 Plumbing of the Specifications for the **HANDICAP ACCESSIBILIY UPGRADES FOR CHALLENGE & REACH ACADEMY, GERARD CREAMER SCHOOL, LINCOLN ELEMENTARY SCHOOL, THORNDYKE ROAD ELEMENTARY SCHOOL**, in accordance with the accompanying Drawings, Specifications and Addenda, prepared by Mount Vernon Group Architects, Inc., 178 Albion Street, Suite 240, Wakefield, Ma 01880, Department of Public Facilities, 50 Officer Manny Familia Drive, Worcester, MA 01605, for the contract price specified below, subject to additions or deductions according to the terms of the Plans and Specifications.

B. This Bid includes Addenda numbered _____.

C. The Proposed Contract Price is:

_____

Dollars ($_____)

Alternates: None

D. Unit Prices:

As authorized by the Owner, should the quantities of certain classes of work to be increased or decreased, as described below, the Unit Prices listed below shall be the basis of payment to the General Contractor, or credit to the Owner, for such increase or decrease in the Work. The Unit Prices shall represent the exact net amount, per unit, to be paid to the General Contractor, in the case of additions. No additional adjustment shall be allowed for overhead, profit, insurance, or other direct or indirect expenses of the General Contractor. No additional adjustments shall be allowed for over excavation, or other related work, without prior written approval of the Owner. Unit prices to be included in the General Contractors base bid.

Lincoln Elementary School:

Unit Price No. 1: Excavation, stockpiling, and removal of unsuitable soils at the new ADA walkways, sidewalk, and utilities and replace with imported suitable backfill materials that is more than or less than 250 cubic yards at

$ _____ per cubic yard, for a total of _____

_____ ($_____).

Unit Price No. 2: Excavation, stockpiling, and removal of unsuitable soils at the building, retaining walls at footings and replace with imported structural infill compacted in place that is more than or less than 100 cubic yards at

$ _____ per cubic yard, for a total of _____

_____ ($_____).

Unit Price No. 3: Excavation, stockpiling, and removal of ledge and boulders measured at 2 cubic yards and larger at the new elevator pit and replace with imported structural infill compacted in place that is more than or less than 50 cubic yards at

$ _____ per cubic yard, for a total of _____

_____ ($_____).

Thorndyke Road Elementary School:

Unit Price No. 4: Excavation, stockpiling, and removal of unsuitable soils at the existing sloped walkway and replace with imported suitable backfill materials that is more than or less than 100 cubic yards at

$ _____ per cubic yard, for a total of _____

_____ ($_____).

Unit Price No. 5: Excavation, stockpiling, and removal of unsuitable soils at the new elevator pit and replace with imported structural infill compacted in place that is more than or less than 100 cubic yards at

$ _____ per cubic yard, for a total of _____

_____ ($_____).

D. To restrict General Bidders, insert "**X**" on one option only and fill in blanks following that selection. If no General Bidders are excluded disregard this item.

_____ **"RESTRICTED FROM"** – This Sub-bid may be used by any General Bidder except:

_____

_____

_____

_____ **"RESTRICTED TO"** – This Sub-bid may be used only by the following General Bidders:

_____

_____

_____

E. The names of all persons, firms and corporations furnishing to the undersigned labor or labor and materials for the class or classes or part thereof of work for which the provisions of the section of the specifications for this sub-trade require a listing in this paragraph, including the undersigned, if customarily furnished by persons on his own payroll and in the absence of a contrary provisions in the specifications, the name of each such class of work or part thereto and the bid price for such class of work or part thereof are:

NAME	CLASS OF WORK	BID PRICE

(Do not give bid price for any class or part thereof furnished by undersigned.)

F. The undersigned agrees that, if he is selected as a sub-bidder, he will, within five (5) days, Saturdays, Sundays and legal holidays excluded, after presentation of a subcontract by the general bidder selected as the general contractor, execute with such General Bidder a subcontract in accordance with the terms of this sub-bid, and contingent upon the execution of the general contract, and, if requested so to do in the general bid by such general bidder, who shall pay the premiums therefore, furnish a performance and payment bond of a surety company qualified to do business under the laws of the Commonwealth of Massachusetts and satisfactory to the awarding authority, in the full sum of the subcontract price.

G. The undersigned agrees that the above list of bids to the undersigned represents bona-fide bids based on the hereinbefore described drawings, specifications and addenda and that, if the undersigned is awarded the contract, they will be used for the work indicated at the amounts stated, if satisfactory to the Awarding Authority.

H. The undersigned further agrees to be bound to the General Contractor by the terms of the hereinbefore-described drawings, specifications, including all general conditions stated therein, and addenda, and to assume toward him all the obligations and responsibilities that he, by those documents, assumes toward the Owner.

I. The undersigned offers the following information as evidence of his qualifications to perform the work as bid upon according to all requirements of the drawings and specifications:

1. The undersigned has been in the present business name _____ years.

2. Has the undersigned ever failed to complete any work awarded? _____

3. Provide a Bank Reference: _____

4. List one or more recent project with names of the General Contractor and Architect on which you served as a Subcontractor for work of similar character as required for the above-named project.

PROJECT NAME	GENERAL CONTRACTOR	ARCHITECT	AMOUNT OF CONTRACT

J. The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work and that he will comply fully with all laws and regulations applicable to awards made subject to Section 44A of Chapter 149 of the Massachusetts General Laws.

K. The undersigned further certifies under penalties of perjury that this bid is in all respects bona-fide, fair and made without collusion or fraud with any other person. As used herein the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The undersigned further certifies under penalties of perjury that the said undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of Section Twenty-nine F of Chapter Twenty-nine, or any other applicable debarment provisions of any other Chapter of the Massachusetts General Laws or any rule or regulation promulgated there under.

L. The undersigned hereby certifies that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and that they will comply fully with all laws and regulations applicable to awards made subject to M.G.L. c.149 sec.44A-J.

Date	Print Name of Bidder
Social Security Number or Federal Identification Number	By _____ Name of Person Signing Bid and Title
Telephone Number	Business Street Address
Fax Number	City, State and ZIP Code

M. The Bidder shall fill in the following information about its business organization.

1. If the Bidder is a Corporation, indicate the state of incorporation.

President:	State of Incorporation:
Treasurer:	Secretary:
If a Foreign Corporation: (incorporated or organized under laws other than laws of the Commonwealth of Massachusetts)	Is the Corporation registered with the Secretary of State of Massachusetts? Yes _____ No _____
If the Bidder is selected for the work referred to above, it is required under Massachusetts General Laws, Chapter 30, Section 39L to furnish to the Awarding Authority a certificate of the Secretary of State stating that the Corporation has complied with Massachusetts General Laws, Chapter 181, Sections 3 and 5 and the date of such compliance.	

2. If the Bidder is a Partnership, give full names and addresses of all partners:

Name of Partner:	Residence Address:
Name of Partner:	Residence Address:
Name of Partner:	Residence Address:

Name of Partner:	Residence Address:

3. If the Bidder is an Individual, give residential address if different from business address:

Name:	Residence Address:

4. If the Bidder is an Individual doing business under a Firm name:

Name of Firm:	Business Address:
Name of Individual:	Residence Address:

5. Other form of business organization:

N. The Bidder will give below the name and address of the Surety Company who will sign the bonds.

Name:	Address:

END OF SECTION

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c. 149 Projects

OWNER-CONTRACTOR AGREEMENT

THIS AGREEMENT made on _____ 20___, at Worcester, in the County of Worcester, Commonwealth of Massachusetts by and between_____, (hereinafter called the Contractor) and the City of Worcester, a municipal corporation within said County of Worcester (hereinafter called the City).

W I T N E S S E T H:

That the Contractor, in consideration of the payments hereinafter mentioned and of the fulfillment of the agreements herein mutually entered into, agrees with the City as follows:

SCOPE OF WORK:

(1) The Contractor shall, pursuant to the terms of this Agreement, provide all the supplies, materials and equipment, and perform all the labor, services and supervision necessary and proper to undertake and complete the _____, including Alternate(s)#_____ at _____ (hereinafter called the "Project") in the City of Worcester, Massachusetts, and to accomplish any and all work incidental thereto.

BONDS:

(2) The Contractor shall obtain and deposit with the City the following bond(s) in the amount of:

PERFORMANCE BOND: _____ Dollars and no cents

($_____.00)

PAYMENT BOND: _____ Dollars and no cents

($_____.00)

with sureties satisfactory to the Contracting Officer to (a) guarantee the faithful performance by the Contractor of all its obligations under this Agreement and (b) constitute the security required by Massachusetts General Laws Chapter l49, Section 29, and Chapter 30, Section 39A, as amended, for the payment by the Contractor and its subcontractors for all labor performed or furnished and for all materials used or employed in connection with this Agreement.

CONTRACTING OFFICER:

(3) (a) Wherever used in this Agreement the term "Contracting Officer" shall mean the City official so designated below, or the individual duly appointed by him/her for the performance of any of his/her functions or responsibilities under this Agreement. The work under this Agreement shall be carried out under the direction and subject to the approval and acceptance of James Bedard, City of Worcester, Department of Public Facilities (hereinafter called the Contracting Officer).

(b) Anything to the contrary in the preceding paragraph notwithstanding, the City's contract compliance officer is and shall be a designee of the Contracting Officer for all notices, demands, sanctions and other communications relative to such officer's administration, monitoring and enforcement of the City's Minority/Women Enterprise Program and the Responsible Employer Ordinance. Each and every communication from the contract compliance officer directly to the Contractor shall be validly delivered notwithstanding any other contrary provision of this Agreement or other Contract Documents.

INCORPORATED DOCUMENTS:

(4) The performance of this Agreement is subject to the provisions of the following documents, all of which are attached hereto and intended to be an integral part of this Agreement (hereinafter periodically and collectively referred to as "the Contract Documents").

(a) Information to Bidders
(b) Bid Proposal, dated _____, 20___.
(c) Specifications and Related Drawings

The Contract Documents are to be read collectively and complementary to one another; any requirement under one shall be as binding as if required by all. In the event of any conflict or inconsistency between the provisions of this Agreement and any of the other Contract Documents, the provisions of this Agreement shall prevail. In the event of any conflict or inconsistency between this Agreement, the other Contract Documents and any applicable state law, the applicable statutory provisions shall prevail. The Contract Documents set forth the entire legal relationship and requirements of the parties, as well as the technical requirements of the Project, and as such constitute the Contract, as hereinafter referred to.

TIME FOR PERFORMANCE:

(5) (a) Time is of the essence for this Agreement. The Work of this Agreement shall be substantially completed August 21, 2026. Final Completion of the work of this agreement of the Work of this agreement shall be no later than 60 days after the date of substantial completion. Replacement of the domestic hot water heaters with associated work shall be the priority effort with the replacement of the boiler and circulating pumps with associated work following. The intent is to have the water heaters replaced as soon as possible.

. Final completion of the Work of this Agreement shall be no later than 60 days after the date of substantial completion. The Date of Substantial Completion shall remain the same, as stated above, regardless of any alternate(s) chosen to be included in the Contract by the Owner.

(b) Except as otherwise expressly provided, none of the following shall constitute a waiver of the General Bidders or its surety's obligations to pay liquidated damages or any portion thereof:

(i) Acceptance of any portion of the Work or payment to the Contractor or its Surety therefor;

(ii) Completion of a portion of the Work or the use or occupancy thereof by the City or others; or

(iii) The City's requiring or allowing the Contractor or its Surety to complete the Work.

PRICE:

(6) The City will pay the Contractor for all materials delivered or furnished and for all the work performed pursuant to Article (1) hereof a sum of money as follows:

_____Dollars and no cents ($_____.00)

PAYMENT:

(7) Payment to the Contractor shall be made by the City in accordance with General Laws Chapter 30, Section 39K, as amended, which is included in the Supplementary General Conditions to the Contract.

(a) The payment shall be in full for furnishing all materials, supplies, labor, services, supervision, tools and equipment and the use thereof as embraced under the Agreement, and except as may be provided under Article (10)(d), shall also constitute the payment for all loss or damage to the Contractor arising out of the nature of the work or from the action of the elements or from any unforeseen difficulties or obstructions which may arise or be encountered during the execution of the work until its final approval by the Contracting Officer, and for all risks to the Contractor of every description connected with the execution of the work or infringement of patents, trade marks, or copyrights and for completing the work in an acceptable manner.

(b) The payment of any periodic estimate or of any retained percentage shall in no way constitute an acceptance of the work or in no way prejudice or affect the obligation of the Contractor at his own cost or expense to repair, correct, renew, or replace any defects or imperfections in the construction as well as all damages due or attributable to such defects, nor shall any such payment for any current estimate or of any retained percentages prejudice or affect the rights of the City to hold the Contractor liable for breach of contract or to avail itself of the remedies under Article (15), hereof.

(c) If at any time there shall be evidence of any lien or other claim for which, if established, the City may become liable, directly or indirectly, and which is chargeable to the Contractor, the City may retain out of any payment then due or thereafter to become due, an amount sufficient to completely indemnify it against any such claim. If there prove to be any such claims after all the payments are made, the Contractor shall refund to the City all moneys that the City pays in discharging such claim in consequence of the Contractor's default.

(d) The Contractor, and each subcontractor, at every tier, to the Contractor, represents, warrants and certifies that it has complied with all laws of the Commonwealth of Massachusetts relating to taxes and all Ordinances and Orders of the City of Worcester relating to taxes, fees and charges, or is lawfully contesting the validity of the same. The Contractor, and each subcontractor, at every tier, further represents, warrants and certifies that it will remain in such compliance during the term of this Agreement, including any amendments or extensions hereto. Breach of any of these provisions shall be deemed a material breach which shall entitle the City to immediately terminate this Agreement and take any other action authorized by law to collect any amounts due the City.

PAYMENT OF SUBCONTRACTORS:

(8) Payment to subcontractors shall be made in accordance with General Laws Chapter 30, Section 39F, as amended, which is included in the Supplementary General Conditions.

NOTICE:

(9) Wherever in this Agreement the City is to give or receive a notice, the Contracting Officer as defined in Article (3) shall be the City's Agent for such purpose.

PERFORMANCE:

(10) (a) The Contractor shall give his personal attention constantly to the faithful execution of the work and shall keep the same under his personal control. He shall not assign by power of attorney, or otherwise, the work or any part thereof without the previous written consent of the Contracting Officer. He shall not either legally or equitably assign any of the moneys payable under this Agreement or any claim thereto unless by and with like consent on the part of the Contracting Officer and the City Treasurer. He shall be responsible for all the acts and omissions of his employees and of all persons directly or indirectly employed by him in connection with the execution of this work.

(b) The Contractor shall provide sufficient and proper facilities at all times for the inspection of the work by the City. He shall, after receiving written notice that certain work or construction is improper, unsafe or defective or that such construction in any way fails to conform to the Contract Documents, forthwith remove such unsafe or defective construction and reconstruct the same in a manner satisfactory to the Contracting Officer. Upon failure of the Contractor to remedy the construction after being so notified, the Contracting Officer in accordance with Article 3.4.1 of the General Conditions may cause such defective work to be remedied or replaced and the City may deduct the cost thereof from any moneys due or to become due the Contractor.

(c) The City, acting through the Contracting Officer, or the project Architect, shall have the authority to suspend the work wholly or any part thereof for such period as deemed necessary due to failure of the Contractor to carry out orders given or to perform any provision of the Agreement. Upon receipt of written order from the Contracting Officer or Architect, the Contractor shall immediately suspend the work or such part thereof in accordance with the order. No work shall be suspended without the written permission of the Contracting Officer or Architect. The work shall be resumed when conditions so warrant or deficiencies have been corrected and the condition of the Contract satisfied as ordered or approved in writing by the Contracting Officer or Architect. No allowance of any kind will be made for suspension of work by order of the Contracting Officer or Architect pursuant to this paragraph.

(d) Any request for an adjustment in the contract price by the Contractor or the City, due to differing subsurface or latent physical conditions, shall be governed by the provisions of General Laws Chapter 30, section 39N, as amended, which is included in the Supplementary General Conditions.

(e) The Contractor agrees that it shall have no claim for damages of any kind on account of any delay in commencement of the work. Post commencement, the Contractor shall have no claim for damages of any kind on account of any delay or suspension of any portion of the work except as hereinafter provided. Adjustments, if any, in the contract price due to a suspension, delay, interruption or failure to act by the City shall be governed by the provisions of General Laws Chapter 30, section 39(O), as amended, which is included in the Supplementary General Conditions. Provided, however, the provisions of this paragraph shall not apply to any suspension pursuant to Section (10)(c), or for any suspension, delay, interruption or failure to act to the extent that such is due to any cause for which this Agreement provides for an equitable adjustment of the contract price, or time, under any other provision. Provided, further, that no adjustment shall be made if the performance of the Contractor would have been prevented by other causes, even if the work had not been so suspended, delayed or interrupted by the City. Provided, further, that a subcontractor shall have the same rights against the Contractor for payment for an increase in the cost of his performance as the provisions of this paragraph gives the Contractor against the City, but nothing herein shall in any way change, modify or alter any other rights which the Contractor and subcontractor may have against each other.

(f) The City may award other contracts for additional work. The Contractor shall cooperate fully with other contractors and carefully fit his own work to that of other contracts as may be directed by the Contracting Officer. The Contractor shall not commit or permit any act that will interfere with the performance of work by any other contractor.

(g) The Contractor shall comply with all the laws, state and federal, applicable to the work and construction provided for herein. This Agreement is made subject to all laws, state and federal; and if any clause hereof does not conform to such law, then such clause shall be void and the law operative shall be inserted in lieu thereof. Any violation by the Contractor of state or federal laws relating to the employment of labor upon the work or the construction contemplated by this

Agreement shall be a sufficient cause for the City to cancel the Agreement without in any way being liable in damages therefor. Should the City cancel the Agreement because of the failure on the part of the Contractor to observe the state or federal laws, or the rules and regulations relating to employment of labor upon the work herein contemplated, then upon cancellation the City reserves all rights and benefits herein or by law provided against the Contractor for the breach of the conditions of this Agreement.

(h) It shall be a material breach of this Agreement if the Contractor and each subcontractor shall not at all times adhere to the provision of § 1A(e)(9) of chapter nine of the Revised Ordinances of the city by limiting their on-site, noise producing construction and related work to the hours specified by said ordinance.

(i) When the use of explosives is necessary for the execution of the work, the Contractor shall take the utmost care not to endanger life and property. Whenever directed, the number and size of the charges shall be reduced. All explosives shall be stored in a secure manner. All such storage places shall be marked clearly "DANGEROUS-EXPLOSIVES", and shall be in the care of competent watchmen at all times. The method of storage and handling explosives and highly inflammable materials shall conform to all the state laws and regulations, as well as any local requirements.

(j) Upon the completion of the work the Contractor shall, at his own expense, remove all equipment, temporary Contractor's buildings and sheds, fencing, rubbish and waste material in and about the area that has been worked and he shall leave the premises and the work performed all in a neat and proper condition.

(k) Before commencing the work the Contractor shall, if required, submit a schedule of operations for approval of the Contracting Officer or Architect. The schedule shall show the methods and order of operations that the Contractor proposes to use. The approval of the schedule by the Contracting Officer or Architect shall not be construed as relieving the Contractor from any responsibility.

(l) Should the Contractor be obstructed or delayed in the execution of the work as a result of damage which may be caused by lightning, earthquake, rain, storm, or cyclone, then the time fixed for completion may be extended for a period equivalent to the time lost by reason of any of the foregoing causes. No such extension shall be made unless a claim therefor is presented in writing to the Contracting Officer within forty-eight (48) hours of the occurrence of such delay. The Contractor shall have no claim against the City for damages on account of such delay. The duration of the extension itself must be certified to by the Contracting Officer or Architect.

ADDITIONAL WORK:

(11) (a) The Contractor agrees to perform any work related to the subject matter of the Contract, but not within its original scope, upon written order of the Contracting Officer or Architect, the payment for such extra work to be made in accordance with whichever of the following methods the Contracting Officer elects: (i) a price agreed upon between the parties and stipulated in the order for the extra work; or (ii) a price based on the unit prices of the contract; or (iii) a price determined to be the reasonable cost of the extra work as computed by the Contracting Officer in accordance with paragraph (b) below.

(b) In computing reasonable cost for the purposes of (iii) above, the Contracting Officer shall include the reasonable cost to the Contractor,

(i) of the cost of prevailing rates for direct labor, material, and use of equipment;

(ii) plus the cost of worker's compensation insurance, liability insurance, federal Social Security insurance, and Massachusetts unemployment compensation insurance or, as an alternative, the Contractor may elect to use a flat twenty-five percent (25%) of the total labor rate in (a);

(iii) plus ten percent (10%) of the total labor rate in (a) for overhead, superintendence and profit, which will be paid to the Contractor for Item 1 work, which is the work of the Contractor and all its non-filed subcontractors. On Item 2 work, which is the work of filed subcontractors, this ten percent (10%) will be allowed only to the filed subcontractor and is not applicable to any Paragraph E sub-subcontractors. The Contractor or the filed subcontractor, as the case may be, shall agree upon the distribution of the ten percent (10%) to their respective subcontractors as a matter of contract therewith;

(iv) for work performed by a filed subcontractor, the Contractor shall accept an additional five percent (5%) of the filed subcontractor's price (less the 10% mark-up), as full compensation for processing forms and assuming full responsibility for the faithful performance of such work by the filed subcontractor(s);

(v) plus actual direct premium costs of payment and performance bonds required of the Contractor and filed subcontractors, provided there will be an appropriate credit for premiums for a credit change order; and

(vi) if the extra work requires the use of heavy equipment, cranes and hoisting equipment, machinery, and special tools not on site and not originally required to be used upon the work, then the cost of transportation to and from the work site, not exceeding 100 miles, shall be included. The cost of extra work shall not include any cost or rental of small tools, buildings, or any portion of the time of Contractor's management or office personnel, or any allowance for use of capital.

(c) The Contracting Officer or Architect may make alterations in the line, grade, plan, form, dimensions, or materials of the subject matter of the Contract, or any part thereof, either before or after commencement of construction. Where such alterations increase the quantity or standard of the work to be done, payment for such increase shall be made in the same way that payment is made for extra work under (a) and (b) above. Where such alterations diminish the quantity or standard of the work to be done, an adjustment shall be made to the benefit of the City based upon the unit prices where used or, where unit prices are not used, as the Contracting Officer shall determine.

EMPLOYMENT:

(12) (a) The Contractor shall employ competent workers and if notified by the Contracting Officer, in writing, that any person engaged upon the work is incompetent, unfaithful, disorderly or otherwise unsatisfactory, then such worker shall be discharged from the work.

(b) In the performance of this Agreement, the Contractor shall comply with the provisions of Worcester Revised Ordinances Chapter 2, Section 35 as amended, which are included in the Supplemental General Conditions to the Contract.

(c) The parties shall comply with the provisions of section 179A of Chapter 149 of the Gen. Laws (Ter. Ed.). Notwithstanding any provisions to the contrary contained in the General or Supplemental Conditions to the Contract, in the employment of persons including mechanics, teamsters, chauffeurs and laborers, under this Contract, preference shall be given:

First: To citizens of the Commonwealth who are residents of the City of Worcester and who have served in the Armed Forces of the United States in time of war and have been honorably discharged therefrom or released from active duty therein, and who are qualified to perform the work to which the employment relates.

Second: To citizens of the Commonwealth who are residents of the City of Worcester and are qualified to perform the work to which the employment relates.

Third: To citizens of the Commonwealth who have served in the Armed Forces of the United States in time of war and have been honorably discharged therefrom or released from active duty therein and who are qualified to perform the work to which the employment relates.

Fourth: To citizens of the Commonwealth generally.

Fifth: To citizens of the United States.

The foregoing provisions shall not apply to those persons employed in a supervisory capacity. In so far as practicable preference is to be given Worcester Truckers in hauling materials.

(d) No laborer, worker, mechanic, foreman, or inspector working within the Commonwealth of Massachusetts in the employ of the Contractor, sub-contractors, or other persons doing or contracting to do the whole or part of the work contemplated by this Agreement, shall be required or permitted to work more than eight (8) hours in any one (1) calendar day; or more than forty-eight (48) hours in one (1) week, or more than six (6) days in any one (1) week in full compliance with provisions of G.L. c. 149, s. 34, except in cases of emergency.

(e) Every employee in the work covered by the Contract shall lodge, board and trade where and with whom he elects and neither the Contractor nor his agents or employees shall directly or indirectly require as a condition of employment therein that an employee shall lodge, board or trade at a particular place or with a particular person.

(f) The Contractor shall provide and maintain in a neat and sanitary condition such accommodations for the use of his employees as may be necessary to comply with the requirements of the Department of Public Health, local health officials or of other appropriate authorities. The maintenance of all sanitary facilities shall be subject to the laws of the Commonwealth and to the rules and regulations of the State Board of Health and of the Commissioner of Public Health for the City of Worcester.

(g) The Contractor shall, before commencing the work, provide by insurance for the payment of compensation and the furnishing of other benefits under Chapter 152 of the General Laws to all persons employed under the Agreement, and he shall continue such insurance in force and effect during the term hereof. The City may require the Contractor to deliver certificates of insurance as sufficient proof of compliance with the foregoing. Failure to provide and continue in force such insurance as aforesaid shall be deemed a material breach of the Agreement and shall entitle the City to terminate the Agreement without in any way being liable in damages therefor.

(h) The Contractor shall keep a true and accurate register of all mechanics, teamsters, chauffeurs and laborers employed upon the work contemplated by this Contract, showing the name, address and occupational classification of each such employee, the hours worked by and the wages paid to each such employee, and shall furnish the Massachusetts Department of Labor and Industries, upon its request, a true statement thereof.

(i) Minimum wage rates under the provisions of General Laws chapter 149, section 27, as amended, have been determined by the Commissioner of Labor and Industries for the Commonwealth, and the Contractor shall in the payment of wages be bound by them during the life of the Agreement. The applicable schedule of minimum wage rates, as so determined, are incorporated elsewhere within the Contract Documents.

TERMINATION:

(13) (a) If the Contractor shall be adjudged as bankrupt, or if he shall make a general assignment for the benefit of his creditors, or if a receiver of his property shall be appointed, or if the work to be done under the Agreement shall be abandoned, or if the Agreement or any part of shall be sublet without the previous written consent of the Contracting Officer, or if the Contract or any claim hereunder shall be assigned by the Contractor otherwise than as herein specified, or if at any time the Contracting Officer shall be of the opinion that the work, or any part thereof, is unnecessarily or unreasonably delayed, or that the Contractor has violated any of the provisions of the Agreement, the Contracting Officer, for and in behalf of the City, may notify the Contractor to discontinue all work, or any part thereof; and thereupon the Contractor shall discontinue such work or such part thereof as the Contracting Officer may designate, remove his equipment, tools, supplies and materials as the Contracting Officer directs, and the City may thereupon, by contract or otherwise, as it may determine, complete the work, or such part thereof, and charge the entire expense of so completing the work or any part thereof to the Contractor.

(b) If the Contracting Officer or Architect shall certify by written notice to the Contractor that the rate of progress is not satisfactory, the City may, instead of notifying the Contractor to discontinue all of the work or any part thereof, notify him from time to time to increase the force, equipment and plant, or any of them, employed on the whole or any part of the work, stating the amount of increase required. Unless the Contractor shall, within seven (7) work days after such notice, increase his force, equipment and plant to the extent required therein, and maintain and employ the same from day to day until the completion of the work or such part thereof or until the conditions as to the rate of progress shall, in the opinion of the Contracting Officer or Architect, be fulfilled, the City may employ and direct the labors of such additional force, equipment and plant as may, in the opinion of the Contracting Officer or Architect, be necessary to ensure the completion of the work or such part thereof within the time specified or at the earliest possible date thereafter, and charge the expense thereof to the Contractor. Neither the notice from the Contracting Officer or Architect to the Contractor to increase his force, equipment or plant nor the employment of additional force, equipment or plant by the City shall be held to prevent a subsequent notice to the Contractor from the City to discontinue the work under the provisions of the preceding portion of this Article.

(c) All expenses charged under this Article shall be deducted by the City out of moneys then due or to become due the Contractor under this Agreement, or any part hereof. In such accounting the City shall not be obligated to obtain the lowest figures for the work of completing the contract or any part thereof, or for insuring its proper completion, and all sums actually paid by the City shall be charged to the Contractor. If the expense so charged is greater than the sum which would have been payable under the Agreement, if the same had been completed by the Contractor, then the Contractor shall pay the amount of the excess to the City upon completion of the work and without further demand being made therefor.

(d) The Contractor shall not be relieved of liability to the City by virtue of any termination of this Agreement and any claim for damages against the Contractor relating to the Contractor's performance hereunder shall survive any termination hereunder.

GUARANTEES:

(14) (a) The Contractor guarantees the work under this Contract and the materials furnished by him for use in connection therewith to be free from defects or flaws for one (1) year after the completion of the work, unless a greater period of time is prescribe by law, or by terms of any special guarantee required under any other provisions of the Contract Documents. It is expressly understood, however, that this guarantee provision shall not absolve the Contractor from any liability to the City arising out of a failure to substantially comply with the terms of the Agreement.

(b) If at any time within said guaranty period, any part of the work constructed under the terms of this Agreement shall, in the opinion of the Contracting Officer or Architect, require repairing due to defective work or materials furnished by the Contractor, he may notify the Contractor in writing to make the required repairs. If the Contractor shall neglect to start such repairs within ten (10) work days of the date of giving him notice thereof and to complete the same to the satisfaction of the Contracting Officer or Architect with reasonable dispatch, then the latter may employ other persons to make such repairs. The City shall charge the expense thereof to the Contractor and may use any moneys still retained to pay for the same, and if such sum is insufficient, the Contractor shall be obligated to pay the balance thereof.

INDEMNIFICATION:

(15) (a) The Contractor shall indemnify and save harmless the City of Worcester and all of its officers, agents and employees against all suits, claims or liability of every name, nature, and description arising out of or in consequence of the acts or omissions of the Contractor in the performance of the work covered by the Agreement and/or his failure to comply with the terms and conditions hereof, and will at his own cost and expense defend any and all such suits and actions.

(b) The Contractor shall bear all losses resulting from the use or storage of explosives and highly inflammable materials, and shall save the City harmless from all claims for bodily injuries or death to any person and from all claims for property damage or destruction arising out of the use or storage of explosives and highly inflammable materials.

(c) The Contractor further covenants to hold and save the City, its officers, servants and employees harmless from and against all and every demand or demands, of any nature or kind for or on account of the use of any patented invention, article or appliance included in the materials and equipment agreed to be furnished, supplied or used under this Agreement.

INSURANCE:

(16) (a) The Contractor shall carry public liability insurance with an insurance company satisfactory to the City so as to save the City harmless from any and all claims for damages arising out of bodily injury to, or death of, any person or persons and for all claims for damages arising out of injury to, or destruction of, property caused by accidents resulting from the use of implements, equipment or labor used in the performance of the Agreement or from any neglect, default omission or want of proper care or misconduct on the part of the Contractor or of any one in his employ during the execution of the work. Such insurance shall include coverage for blasting and explosion, if explosives are to be used.

(b) The Contractor shall carry any other types of insurance as may be required elsewhere in the Contract Documents. All insurance policies required in the Contract Documents shall be provided by companies satisfactory to the City.

(c) Prior to starting work under this Agreement, the Contractor shall deposit, with the City's Law Department, certificates from the insurers to the effect that the insurance policies required in the above paragraphs have been issued to the Contractor. The certificates must be on a form satisfactory to the Law Department.

(d) Unless greater amounts of insurance coverage are required elsewhere in the Contract Documents, the amounts of such public liability insurance shall not be less than the minimum amounts set forth below:

(i) Liability for bodily injury, including accidental death, $250,000.00 for any one person and, subject to the same limit for each person, $500,000.00 on account of one accident.

(ii) Liability for property damage, $100,000.00 on account of any one accident and $300,000.00 on account of all accidents.

(iii) Workers' compensation/employers' liability – MA statutory requirements.

(e) Unless greater amounts of insurance coverage are required elsewhere in the Contract Documents, the Contractor shall also carry bodily injury and property damage insurance in amounts not less than those set forth above, covering the operation of all motor vehicles owned by the Contractor and engaged in this work.

(f) No cancellation of any insurance whether by the insurer or by the insured shall be effective unless written notice thereof is given to the City at least fifteen (15) days prior to the intended effective date thereof, which date has been expressed in the notice. Prior to the effective date of any such cancellation the Contractor shall take out new insurance to cover the policies so cancelled. The Insurance Companies shall remain liable, however, until new and satisfactory insurance policies have been delivered to, and accepted by, the City.

CONFLICT OF INTEREST:

(17) (a) The Contractor warrants that he has complied with all provisions of law regarding the award of this Contract and that he, or his employees, agents, officers, directors or trustees have not offered or attempted to offer anything of any value to any employee of the City in connection herewith.

(b) The Contractor further warrants that no elected official or employee of the City of Worcester, including unpaid members of City boards and commissions, serves as an officer, director, trustee or employee of Contractor, and that no elected officials or employees of the City of Worcester have or will have a direct or indirect financial interest in this Agreement. The foregoing shall not apply, however, if the Contractor qualifies for an exemption and complies with the applicable disclosure provision(s) under G. L. c. 268A.

(c) Violation of this Article shall be a material breach of this Agreement and shall be grounds for immediate termination hereof by the City without regard to any enforcement activities undertaken or completed by any enforcement agency. Termination of this Agreement pursuant to this Article shall not waive any claims for damages the City may have against the Contractor resulting from the Contractor's violation of the terms of this Article.

SEVERABILITY:

(18) If any provision of this Agreement is held invalid by any court or body of competent jurisdiction, the remainder of this Contract shall remain in full force and effect.

HEADINGS:

(19) The section headings in this Agreement are for convenience and reference only and in no way define or limit the scope or content of this Agreement or in any way affect its provisions.

AMENDMENTS:

(20) This Agreement may be amended or modified only by written instrument duly executed by the parties.

ENTIRE AGREEMENT:

(21) This Agreement contains the entire understanding of the parties and supercedes all prior agreements, representations, proposals and undertakings of the parties.

IN WITNESS WHEREOF the Contractor has hereunto set his hand and seal and the City has caused its corporate seal to be hereto affixed and this Agreement to be executed in its name and behalf by a duly authorized officer thereof the day and year first above written.

CITY OF WORCESTER

RECOMMENDED:

_____
James Bedard, Chief
Department of Public Facilities

CONTRACTOR

BY: _____(SEAL)

APPROVED AS TO LEGAL FORM:

_____

CERTIFICATION OF FUNDING

I certify that an appropriation of funds in the amount of this Agreement is contained in account number _____.

_____
Robert V. Stearns
City Auditor

APPROVED:

_____
Eric D. Batista
City Manager

PAYMENT BOND

KNOW ALL BY THESE PRESENTS, that _____, a _____ corporation duly established by law and having a usual place of business at _____, as PRINCIPAL, and_____, a corporation organized under the laws of the State or Commonwealth of _____, and duly authorized and admitted, under the provisions of Chapter 175 of the Massachusetts General Laws, as amended, to transact the business of a fidelity and surety company in Massachusetts, as SURETY, are held and firmly bound unto the City of Worcester, a municipal corporation within the Commonwealth of Massachusetts, in the sum of _____ Dollars and no cents ($_____.00) lawful money of the United States of America, to be paid to the City of Worcester, its successors and assigns, to the payment of which, well and truly to be made, the PRINCIPAL and the SURETY bind themselves, their respective heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the said PRINCIPAL has entered into an Agreement of even date herewith with the City of Worcester, said Agreement being for the _____ at _____ in the City of Worcester, Massachusetts;

NOW THEREFORE, the condition of this obligation is such that if the PRINCIPAL shall pay for all labor performed or furnished and for all materials used or employed or any appliance and equipment used or employed or rented or hired out in the execution of said Agreement and in any and all duly authorized modifications, alterations, extensions of time, changes or additions to said Agreement that may hereafter be made, notice to the SURETY of such modifications, alterations, extensions of time, changes or additions being hereby waived, the foregoing to include any other purposes or items set out in, and to be subject to, the provisions of Massachusetts General Laws, Chapter 149, Section 29 and Chapter 30, Section 39A, as amended, then this obligation shall become null and void; otherwise it shall remain in full force and virtue.

IN TESTIMONY WHEREOF, the PRINCIPAL has hereunto caused its name and seal to be affixed, and the SURETY has caused its corporate seal to be hereunto affixed by a duly authorized officer thereof and this instrument to be executed and delivered in its name and behalf by its attorney-in-fact, duly authorized by its by-laws and votes, powers of attorney, and letters of appointment and authorization, certificated copies of which documents are annexed to this bond and may be introduced in evidence as if a part hereof.

(PRINCIPAL) _____ (SEAL)

By:_____

(SURETY) _____ (SEAL)

_____
Attorney-in-Fact

PERFORMANCE BOND

KNOW ALL BY THESE PRESENTS, that _____, a_____ corporation duly established by law and having a usual place of business at_____ as PRINCIPAL, and_____, a corporation organized under the laws of the State or Commonwealth of_____, and duly authorized and admitted, under the provisions of Chapter 175 of the Massachusetts General Laws, as amended, to transact the business of a fidelity and surety company in Massachusetts, as SURETY, are held and firmly bound unto the City of Worcester, a municipal corporation within said Commonwealth of Massachusetts, in the sum of $_____Dollars and no cents ($_____.00) lawful money of the United States of America, to be paid to said City of Worcester, its successors and assigns, to the payment of which, well and truly to be made, the PRINCIPAL and the SURETY bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the said PRINCIPAL has entered into an Agreement of even date herewith with the City of Worcester, said Agreement being for the _____, inclusive, at _____in the City of Worcester, Massachusetts;

NOW THEREFORE, the condition of this obligation is such that if the said PRINCIPAL shall well and faithfully perform all the terms and conditions of said Agreement on its part to be kept and performed as therein stipulated, including guarantee and maintenance provisions therein, and shall pay for all materials furnished and for all labor performed in the execution of said Agreement, and shall indemnify and save harmless the said City of Worcester as therein stipulated, then this obligation shall be of no effect; otherwise it shall remain in full force and virtue.

And the said SURETY, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of said Agreement, or to the work to be performed thereunder, or to the specifications accompanying the same, shall in any way effect its obligation on this bond; and it does hereby waive notice of any change, extension of time, alterations or additions to the terms of said Agreement, or to the work, or to the specifications.

In the event that the Agreement is abandoned by the Contractor, or is terminated by the City of Worcester, under the provisions thereof, said SURETY hereby further agrees that it shall, if requested in writing by the City of Worcester, take such action as is necessary to complete said Agreement.

IN TESTIMONY WHEREOF, the PRINCIPAL has hereunto caused its name and seal to be affixed, and the SURETY has caused its corporate seal to be hereunto affixed by a duly authorized officer thereof and this instrument to be executed and delivered in its name and behalf by its attorney-in-fact, duly authorized by its by-laws and votes, powers of attorney, and letters of appointment and authorization, certificated copies of which documents are annexed to this bond and may be introduced in evidence as if a part hereof.

(PRINCIPAL) _____ (SEAL)

By: _____

(SURETY)_____ (SEAL)

_____
Attorney-in-Fact

STATE LAW NOW MANDATES THAT TO DO BUSINESS WITH THE CITY OF WORCESTER the Massachusetts Revenue Enforcement and Protection Program of 1983 requires that the following be supplied:

DATE: _____

Pursuant to Mass. G.L. c. 62C, Section 49A, I Certify under the Penalties of Perjury That I, To My Best Knowledge and Belief, Have Filed All Massachusetts State Tax Returns and Paid ALL Massachusetts State and City Taxes Required under Law.

Company Name _____

Street & No. _____ _____
Signature of Individual
or
Corporate Officer
(if applicable)

City or Town _____ Tel No. _____

STATE _____ Zip Code _____

_____
SOCIAL SECURITY NUMBER
OR
FEDERAL IDENTIFICATION NUMBER

CERTIFICATE OF VOTE OF AUTHORIZATION

Date _____

I hereby certify that at a meeting of the Board of Directors of: _____ duly called and held on the _____ day of _____, 20___, at which time it was voted that _____ (name), _____ (title) be and hereby is authorized to execute and deliver for and in behalf of the corporation, a contract with the City of Worcester for _____ (the "Project") in the City of Worcester and, as Principal to execute a Performance Bond and Labor and Materials Bond in connection therewith, which Contract and Bonds were presented to and made a part of the records of said meeting.

I further certify that _____ is the duly qualified and acting _____ of the Corporation and that said vote has not been repealed, rescinded or amended.

A true copy of the record,

ATTEST

_____
Clerk of the Corporation

(Corporate Seal)

Sworn to and subscribed to me this ___ day of _____, 20___.

_____
Notary Public
My Commission Expires:

Certificate of Acknowledgement of Contractor if a Corporation

for AGREEMENT

State of _____)
ss
County of _____)

On this ____ day of _____, 20___, before me personally came _____ to me known, who being by me duly sworn, did depose and say as follows:

That he/she resides at _____

and is the _____ (title) of _____, the corporation described in and which executed the foregoing instrument; that he/she knows the corporate seal of said corporation; that the seal affixed to the foregoing instrument is such corporate seal and it was so affixed by order of the Board of Directors of said corporation; and that by the like order he/she signed thereto his/her name and official designation.

_____
Notary Public (Seal)

My Commission Expires: _____

Certificate of Acknowledgment of Contractor if a Corporation

FOR CONTRACT BONDS

State of _____)
ss
County of _____)

On this ___ day of _____, 20___, before me personally came _____ to me known, who being by me duly sworn, did depose and say as follows:

That he/she resides at _____

and is the _____ (title) of _____, the corporation described in and which executed the foregoing instrument; that he/she knows the corporate seal of said corporation; that the seal affixed to the foregoing instrument is such corporate seal and it was so affixed by order of the Board of Directors of said corporation; and that by the like order he/she signed thereto his/her name and official designation.

_____
Notary Public (Seal)

My Commission Expires: _____

END OF SECTION

CITY OF WORCESTER

FORM OF SUBCONTRACT

(Revised 1/6/93)

CONTRACT

THIS AGREEMENT made this _____ day of _____, 20_____,

by and between _____
(a Corporation organized and existing under the laws of _____),
(a Partnership consisting of _____),
(an Individual doing business as _____),

hereinafter called the "Contractor",

and _____
(a Corporation organized and existing under the laws of _____),
(a Partnership consisting of _____),
(an Individual doing business as _____),

hereinafter called the "Subcontractor".

WITNESSETH, that the Contractor and the Subcontractor for the considerations hereafter named, agree as follows:

1. The Subcontractor agrees to furnish all labor and materials required for the completion of all work specified in Section No. _____ of the specifications for _____ _____ (Name of Sub-Trade) and the drawings referred to therein and addenda Nos. _____, _____, _____, and ___for the _____ _____ (complete title of the project and the project number taken from title page of the project manual) as prepared by Mount Vernon Group Architects, Inc., 264 Exchange Street, Suite G4, Chicopee, MA 01013, for the sum of _____ ($ _____) and the Contractor agrees to pay the Subcontractor said sum of said work.

a) The Subcontractor agrees to be bound to the Contractor by the terms of the hereinbefore described drawings, specifications (including all general conditions stated therein) and addenda Nos. __, _____, _____, and __, and to assume to the Contractor all the obligations and responsibilities that the Contractor by those documents assumes to _____(hereinafter called the "Awarding Authority"), except to the extent that provisions contained therein are by their terms or by law applicable only to the Contractor.

b) The Contractor agrees to be bound to the Subcontractor by the terms of the hereinbefore described documents and to assume to the Subcontractor all the obligations and responsibilities that the Awarding Authority, by the terms of the hereinbefore described documents, assumes to the Contractor, except to the extent that provisions contained therein are by their terms or by law applicable only to the Awarding Authority.

c) Anything contained herein to the contrary notwithstanding, to the fullest extent allowed by law, the Subcontractor shall indemnify and hold harmless the Contractor, Architect, and Awarding Authority, their agents and employees, from and against all claims, damages, losses and expenses, including but not limited to attorney's fees, arising out of or resulting from the performance of the work, provided that any such claim, damage, loss or expense (1) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including the loss of use resulting there from and (2) is caused in whole or in part by any negligent act or omission of the Subcontractor, anyone directly or indirectly employed by the Subcontractor, or anyone for whose acts the Subcontractor may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right or obligation of indemnity, which would otherwise exist as to any party or person, described in this provision.

2. The Contractor agrees to begin, prosecute and complete the entire work specified by the Awarding Authority in an orderly manner so that the Subcontractor will be able to begin, prosecute and complete the work described in this subcontract; and, in consideration thereof, upon notice from the Contractor, either oral or in writing, the Subcontractor agrees to begin, prosecute and complete the work described in this Subcontract in an orderly manner and with due consideration to the date or time specified by the Awarding Authority for the completion of the entire work.

3. The Subcontractor agrees to furnish to the Contractor within a reasonable time after the execution of this subcontract, evidence of workmen's compensation insurance as required by law and evidence of public liability and property damage insurance of the type and in limits required to be furnished to the Awarding Authority by the Contractor.

4. The Contractor agrees that no claim for services rendered or materials furnished by the Contractor to the Subcontractor shall be valid unless written notice thereof is given by the Contractor to the Subcontractor during the first ten (10) days of the calendar month following that in which the claim originated.

5. This agreement is contingent upon the execution of a general contract between the Contractor and the Awarding Authority for the complete work.

[remainder of page intentionally blank/signature page to follow]

IN WITNESS WHEREOF, the parties hereto have executed this agreement the day and year first above-written.

SEAL

ATTEST:

_____ _____
(Name of Subcontractor)

By:_____

SEAL

ATTEST:

_____ _____
(Name of Contractor)

By:_____

END OF SECTION

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SECTION 00 80 00

PREVAILING WAGE RATES

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.2 SUMMARY

A. This Section specifies the List of Jobs; Classifications; Determination of Rate of Wages; Schedule: as established under Statutory reference: M.G.L. Chapter 149, Section 26 and 27. These requirements apply to every contract or subcontract performing work on this public works project.

B. Related Sections: Sections which contain requirements that relate to this Section include, but are not limited to the following:

1. Section 00150
2. Section 00950
3. Section 01300
4. Section 01700

C. The aforesaid rates of wages in the schedule of wage rates shall include payments by employers to health and welfare plans, pension plans and supplementary unemployment benefit plans as indicated in Supplementary Conditions section 00300, and such payments shall be considered as payments to persons under this section performing work as herein provided. Any employer engaged in the construction of such work who does not make payments to a health and welfare plan, a pension plan and supplementary unemployment benefit plan, where such payments are included in said rates of wages, shall pay the amount of said payments directly to each employee engaged in said construction.

D. Every Contractor and Sub-Contractor at any and all tiers shall complete the "WEEKLY PAYROLL REPORT FORM" and submit a copy to the Contract Compliance Office (indicated below) for each week **consecutively**, after the start of that trades work.

E. "WEEKLY PAYROLL REPORTS" shall be required to be submitted **consecutively**, for each week from the start of work until the completion of his work, regardless of whether work was actually being performed on or off-site.

1. When work is not performed; indicate on the form the corresponding week ending dates and post "NO WORK PERFORMED" conspicuously on the front of said form.

2. Weekly reports shall be required until the contractor executes and furnishes to the Department of Labor and Workforce Development/Division of Occupational Safety the final "STATEMENT OF COMPLIANCE" bound herein.

F. SUBMIT TO:

Purchasing Department
455 Main Street
Worcester, MA 01605
purchasing@worcesterma.gov
Tel 508-799-1220

1.3 SAMPLE FORMS FOLLOW THIS PAGE.

A. Final form and format shall be as approved by the Contract Compliance Office.

WEEKLY PAYROLL RECORDS REPORT & STATEMENT OF COMPLIANCE

In accordance with Massachusetts General Law c. 149, §27B, a true and accurate record must be kept of all persons employed on the public works project for which the enclosed rates have been provided. A Payroll Form has been printed on the reverse of this page and includes all the information required to be kept by law. Every contractor or subcontractor is required to keep these records and preserve them for a period of three years from the date of completion of the contract.

In addition, every contractor and subcontractor is required to submit, on a weekly basis, a copy of their weekly payroll records to the awarding authority. For every week in which an apprentice is employed, a photocopy of the apprentice's identification card must be attached to the payroll report. Once collected, the awarding authority is also required to preserve those reports for three years.

In addition, each such contractor, subcontractor, or public body shall furnish to the awarding authority directly, within fifteen days after completion of its portion of the work, a statement, executed by the contractor, subcontractor or public body who supervises the payment of wages, in the following form:

STATEMENT OF COMPLIANCE

_____, 200_____

I,_____,_____
(Name of signatory party) (Title)

do hereby state that I pay or supervise the payment of the persons employed by

_____ on the _____
(Contractor, subcontractor or public body) (Building or project)

and that all mechanics and apprentices, teamsters, chauffeurs and laborers employed on said project have been paid in accordance with wages determined under the provisions of sections twenty-six and twenty-seven of chapter one hundred and forty nine of the General Laws.

Signature _____

Title _____

WEEKLY PAYROLL REPORT FORM

Company Name: _____ ☐ Prime Contractor

Project Name: _____ ☐ Subcontractor
List Prime Contractor: _____

Awarding Auth.: _____ Employer Signature: _____

Work Week Ending: _____ Print Name & Title: _____

☐ Final Report

Employee Name & Address	Work Classification	Hours Worked							(A) Tot. Hrs.	(B) Hourly Base Wage	Employer Contributions			(F) [B+C+D+E] Hourly Total Wage (prev. wage)	(G) [A*F] Weekly Total Amount
		S	M	T	W	T	F	S			(C) Health & Welfare	(D) Pension	(E) Supp. Unemp.		

NOTE: Every contractor and subcontractor is required to submit a copy of their weekly payroll records to the awarding authority.

THE MASSACHUSETTS PREVAILING WAGE LAW
(MGL. c149, §§26-27H)

AN IMPORTANT GUIDE FOR
CONTRACTORS
DOING PUBLIC WORKS
PROJECTS
IN
MASSACHUSETTS

PREVAILING WAGE SCHEDULES

Every contractor should obtain a schedule of prevailing wage rates for every public works project from the Awarding Authority (city, town, county, district, state agency or authority). It is the awarding authority's responsibility to ensure that a copy of the wage schedule is provided to all contractors from whom estimates or bids are solicited for all projects. The Department of Labor and Industries (DLl) will not issue wage schedules directly to contractors or employees.

Once a wage schedule has been issued for a project by DLI, it will remain in effect for the entire project. Appeals of wage determinations or classifications of employment may be made to the DLI commissioner.

A copy of the wage schedule is required to be posted at the work site.

A wage schedule issued for a project may not be used on any other project. If, by chance, an Awarding Authority fails to provide you with a wage schedule to use when figuring your bid, do not use one you may have from another project.

In this case, you should contact DLI immediately and urge the awarding authority to contact DLI to correct the oversight.

The failure of an Awarding Authority to provide a wage schedule does not excuse a contractor from paying the prevailing rate.

BIDDING

The Attorney General's Division of Fair Labor & Business Practices enforces the prevailing wage law. All bids must reflect prevailing wage rates. Contractors may be required by an Awarding Authority to "demonstrate ... how (they) could complete the project and comply with Mass. Gen. Laws." The Division issued an "Advisory" discussing these and other points. For a copy, please contact the Attorney General's Office.

PAYING EMPLOYEES

Prevailing wages must be paid to all employees on public works projects regardless of whether they are employed by the general contractor, a filed sub-bidder or any sub-contractor. The prevailing wage applies equally to unionized and non-unionized workers.

All employees who perform work on a public works project must be paid hourly according to the wage schedule issued for the particular project.

The wage schedule issued for each project is in effect for the duration of that project. All wage increases listed on the schedule must be paid on the specified dates.

Employers are limited in the deductions that can be made from the hourly rate (represented as the ”total rate” on the wage schedules). Only contributions to the following plans may be deducted:

1. Health Plan
2. Pension
3. Supplementary Unemployment

All contributions must be made to bona fide plans.

If an employer contributes to any, or all, of the above plans, it may deduct the hourly amount contributed from the “total rate.” If the employer does not contribute to any of the benefit plans listed above, then the employee’s hourly rate of pay will be the “total rate” from the wage schedule.

All other deductions, including and not limited to the following,” from the wage schedule.

All other deductions, including and not limited to the following, may not be subtracted from the employee’s hourly wage rate:

1. Vacation Time
2. Sick Time
3. Training Funds
4. Charitable Contributions
5. Worker’s Compensation
6. Unemployment Insurance
7. Uniforms

Overtime, which must be paid to all employees who work more than 40 hours per week, shall be at least time-and-one-half the base rate (“total rate” less benefits, if any).

Any “separate check” given to an employee as the “benefit portion” of the prevailing wage may not be treated differently than the check for “base wages.” All “separate checks” are considered wages and subject to state and federal taxes, unemployment insurance, and worker’s compensation requirements.

PAYROLL RECORDS

Employers are required to submit weekly-certified payroll reports to the Awarding Authority and keep them on file for three (3) years. A reporting form is sent along with each wage schedule that may be used. Each report must contain at least: the employee's name, address, occupational classification, hours worked and wages paid. Do not submit weekly payroll reports to DLI.

After each contractor completes its portion of the public works project, the contractor must submit a Statement of Compliance to DLI. A Statement of Compliance form is also sent along with each wage schedule issued.

APPRENTICES

If your company employs apprentices, they must be registered with the Division of Apprentice Training. All persons not registered with DAT must be paid the "total rate" listed on the wage schedule. An apprentice sheet showing percentages based on the apprentice steps is included with all wage schedules.

PENALTIES

Failure to pay the prevailing wage subjects the contractor to potential civil and criminal liability.

Wage schedules are issued by:
MA Dept. of Labor & Industries
100 Cambridge St., 11th Fl.
Boston, MA 02202
(617) 727-3492

Enforcement is carried out by:
Office of the Attorney General,
Fair Labor & Business Practices Div.
100 Cambridge St., 11th Fl.
Boston, MA 02202
(617) 727-3477

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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MAURA HEALEY
Governor

KIM DRISCOLL
Lt. Governor

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS

Prevailing Wage Rates

As determined by the Director under the provisions of the Massachusetts General Laws, Chapter 149, Sections 26 to 27H

LAUREN JONES
Secretary

MICHAEL FLANAGAN
Director

Awarding Authority: City of Worcester

Contract Number: 2407 **City/Town:** WORCESTER

Description of Work: Accessibility upgrades to 4 Worcester Public Schools

Job Location: 20 Irving Street, Worcester, MA 01605

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

• The wage rates will remain in effect for the duration of the project, except in the case of multi-year public construction projects. For construction projects lasting longer than one year, awarding authorities must request an updated wage schedule no later than two weeks before the anniversary of the date the contract was executed by the awarding authority and the general contractor. For multi-year CM AT RISK projects, the awarding authority must request an annual update no later than two weeks before the anniversary date, determined as the earlier of: (a) the execution date of the GMP Amendment, or (b) the execution date of the first amendment to permit procurement of construction services. The updated wage schedule must be provided to all contractors, including general and sub-contractors, working on the construction project.

• This annual update requirement is generally not applicable to 27F "rental of equipment" contracts. For such contracts, the prevailing wage rates issued by DLS shall remain in effect for the duration of the contract term. However, if the prevailing wage rate sheet issued does not contain wage rates for each year covered by the contract term, the Awarding Authority must request updated rate sheets from DLS and provide them to the contractor to ensure the correct rates are being paid throughout the duration of the contract. Additionally, if an Awarding Authority exercises an option to renew or extend the contract term, they must request updated rate sheets form DLS and provide them to the contractor.

• This wage schedule applies only to the specific project referenced at the top of this page and uniquely identified by the "Wage Request Number" on all pages of this schedule.

• An Awarding Authority must request an updated wage schedule if it has not opened bids or selected a contractor within90 days of the date of issuance of the wage schedule. For CM AT RISK projects (bid pursuant to G.L. c.149A), the earlier of: (a) the execution date of the GMP Amendment, or (b) the bid for the first construction scope of work must be within 90-days of the wage schedule issuance date.

• The wage schedule shall be incorporated in any advertisement or call for bids for the project as required by M.G.L. c. 149, § 27.The wage schedule shall be made a part of the contract awarded for the project. The wage schedule must be posted in a conspicuous place at the work site for the life of the project in accordance with M.G.L. c. 149 § 27. The wages listed on the wage schedule must be paid to employees performing construction work on the project whether they are employed by the prime contractor, a filed sub-bidder, or a sub-contractor.

• Apprentices working on the project are required to be registered with the Massachusetts Division of Apprentice Standards (DAS). Apprentices must keep their apprentice identification card on their persons during all work hours on the project. An apprentice registered with DAS may be paid the lower apprentice wage rate at the applicable step as provided on the prevailing wage schedule. **Any apprentice not registered with DAS regardless of whether they are registered with another federal, state, local, or private agency must be paid the journeyworker's rate.**

• Every contractor or subcontractor working on the construction project must submit weekly payroll reports and a Statement of Compliance directly to the awarding authority by mail or email and keep them on file for three years. Each weekly payroll report must contain: the employee's name, address, occupational classification, hours worked, and wages paid. Do not submit weekly payroll reports to DLS. For a sample payroll reporting form go to http://www.mass.gov/dols/pw.

• Contractors with questions about the wage rates or classifications included on the wage schedule have an affirmative obligation to inquire with DLS at (617) 626-6953.

• Contractors must obtain the wage schedules from awarding authorities. Failure of a contractor or subcontractor to pay the prevailing wage rates listed on the wage schedule to all employees who perform construction work on the project is a violation of the law and subjects the contractor or subcontractor to civil and criminal penalties.

• Employees not receiving the prevailing wage rate set forth on the wage schedule may file a complaint with the Fair Labor Division of the office of the Attorney General at (617) 727-3465.

Issue Date: 09/05/2024 **Wage Request Number:** 20240905-001

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	06/01/2024	$39.95	$15.07	$18.67	$0.00	$73.69
	12/01/2024	$39.95	$15.07	$20.17	$0.00	$75.19
	01/01/2025	$39.95	$15.57	$20.17	$0.00	$75.69
	06/01/2025	$40.95	$15.57	$20.17	$0.00	$76.69
	12/01/2025	$40.95	$15.57	$21.78	$0.00	$78.30
	01/01/2026	$40.95	$16.17	$21.78	$0.00	$78.90
	06/01/2026	$41.95	$16.17	$21.78	$0.00	$79.90
	12/01/2026	$41.95	$16.17	$23.52	$0.00	$81.64
	01/01/2027	$41.95	$16.77	$23.52	$0.00	$82.24
(3 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	06/01/2024	$40.02	$15.07	$18.67	$0.00	$73.76
	12/01/2024	$40.02	$15.07	$20.17	$0.00	$75.26
	01/01/2025	$40.02	$15.57	$20.17	$0.00	$75.76
	06/01/2025	$41.02	$15.57	$20.17	$0.00	$76.76
	12/01/2025	$41.02	$15.57	$21.78	$0.00	$78.37
	01/01/2026	$41.02	$16.17	$21.78	$0.00	$78.97
	06/01/2026	$42.02	$16.17	$21.78	$0.00	$79.97
	12/01/2026	$42.02	$16.17	$23.52	$0.00	$81.71
	01/01/2027	$42.02	$16.77	$23.52	$0.00	$82.31
(4 & 5 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	06/01/2024	$40.14	$15.07	$18.67	$0.00	$73.88
	12/01/2024	$40.14	$15.07	$20.17	$0.00	$75.38
	01/01/2025	$40.14	$15.57	$20.17	$0.00	$75.88
	06/01/2025	$41.14	$15.57	$20.17	$0.00	$76.88
	12/01/2025	$41.14	$15.57	$21.78	$0.00	$78.49
	01/01/2026	$41.14	$16.17	$21.78	$0.00	$79.09
	06/01/2026	$42.14	$16.17	$21.78	$0.00	$80.09
	12/01/2026	$42.14	$16.17	$23.52	$0.00	$81.83
	01/01/2027	$42.14	$16.77	$23.52	$0.00	$82.43
ADS/SUBMERSIBLE PILOT *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR *LABORERS - ZONE 2*	06/01/2024	$39.28	$9.65	$18.40	$0.00	$67.33
	12/01/2024	$40.61	$9.65	$18.40	$0.00	$68.66
	06/01/2025	$42.00	$9.65	$18.40	$0.00	$70.05
	12/01/2025	$43.38	$9.65	$18.40	$0.00	$71.43
	06/01/2026	$44.82	$9.65	$18.40	$0.00	$72.87
	12/01/2026	$46.26	$9.65	$18.40	$0.00	$74.31
	06/01/2027	$47.71	$9.65	$18.40	$0.00	$75.76
	12/01/2027	$49.16	$9.65	$18.40	$0.00	$77.21
	06/01/2028	$50.66	$9.65	$18.40	$0.00	$78.71
	12/01/2028	$52.16	$9.65	$18.40	$0.00	$80.21
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
AIR TRACK OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2024	$39.28	$9.65	$17.80	$0.00	$66.73
	12/01/2024	$40.61	$9.65	$17.80	$0.00	$68.06
	06/01/2025	$42.00	$9.65	$17.80	$0.00	$69.45
	12/01/2025	$43.38	$9.65	$17.80	$0.00	$70.83
	06/01/2026	$44.82	$9.65	$17.80	$0.00	$72.27
	12/01/2026	$46.26	$9.65	$17.80	$0.00	$73.71
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
ASBESTOS WORKER (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (WORCESTER)*	06/01/2024	$41.80	$14.50	$11.05	$0.00	$67.35
	12/01/2024	$42.80	$14.50	$11.05	$0.00	$68.35
	06/01/2025	$43.80	$14.50	$11.05	$0.00	$69.35
	12/01/2025	$44.80	$14.50	$11.05	$0.00	$70.35
ASPHALT RAKER *LABORERS - ZONE 2*	06/01/2024	$38.78	$9.65	$18.40	$0.00	$66.83
	12/01/2024	$40.11	$9.65	$18.40	$0.00	$68.16
	06/01/2025	$41.50	$9.65	$18.40	$0.00	$69.55
	12/01/2025	$42.88	$9.65	$18.40	$0.00	$70.93
	06/01/2026	$44.32	$9.65	$18.40	$0.00	$72.37
	12/01/2026	$45.76	$9.65	$18.40	$0.00	$73.81
	06/01/2027	$47.21	$9.65	$18.40	$0.00	$75.26
	12/01/2027	$48.66	$9.65	$18.40	$0.00	$76.71
	06/01/2028	$50.16	$9.65	$18.40	$0.00	$78.21
	12/01/2028	$51.66	$9.65	$18.40	$0.00	$79.71
For apprentice rates see "Apprentice- LABORER"						
ASPHALT RAKER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2024	$38.78	$9.65	$17.80	$0.00	$66.23
	12/01/2024	$40.11	$9.65	$17.80	$0.00	$67.56
	06/01/2025	$41.50	$9.65	$17.80	$0.00	$68.95
	12/01/2025	$42.88	$9.65	$17.80	$0.00	$70.33
	06/01/2026	$44.32	$9.65	$17.80	$0.00	$71.77
	12/01/2026	$45.76	$9.65	$17.80	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$56.03	$15.30	$16.40	$0.00	$87.73
	12/01/2024	$57.48	$15.30	$16.40	$0.00	$89.18
	06/01/2025	$58.78	$15.30	$16.40	$0.00	$90.48
	12/01/2025	$60.23	$15.30	$16.40	$0.00	$91.93
	06/01/2026	$61.53	$15.30	$16.40	$0.00	$93.23
	12/01/2026	$62.98	$15.30	$16.40	$0.00	$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$56.03	$15.30	$16.40	$0.00	$87.73
	12/01/2024	$57.48	$15.30	$16.40	$0.00	$89.18
	06/01/2025	$58.78	$15.30	$16.40	$0.00	$90.48
	12/01/2025	$60.23	$15.30	$16.40	$0.00	$91.93
	06/01/2026	$61.53	$15.30	$16.40	$0.00	$93.23
	12/01/2026	$62.98	$15.30	$16.40	$0.00	$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BARCO-TYPE JUMPING TAMPER *LABORERS - ZONE 2*	06/01/2024	$38.78	$9.65	$18.40	$0.00	$66.83
	12/01/2024	$40.11	$9.65	$18.40	$0.00	$68.16
	06/01/2025	$41.50	$9.65	$18.40	$0.00	$69.55
	12/01/2025	$42.88	$9.65	$18.40	$0.00	$70.93
	06/01/2026	$44.32	$9.65	$18.40	$0.00	$72.37
	12/01/2026	$45.76	$9.65	$18.40	$0.00	$73.81
	06/01/2027	$47.21	$9.65	$18.40	$0.00	$75.26
	12/01/2027	$48.66	$9.65	$18.40	$0.00	$76.71
	06/01/2028	$50.16	$9.65	$18.40	$0.00	$78.21
	12/01/2028	$51.66	$9.65	$18.40	$0.00	$79.71
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER *LABORERS - ZONE 2*	06/01/2024	$39.28	$9.65	$18.40	$0.00	$67.33
	12/01/2024	$40.61	$9.65	$18.40	$0.00	$68.66
	06/01/2025	$42.00	$9.65	$18.40	$0.00	$70.05
	12/01/2025	$43.38	$9.65	$18.40	$0.00	$71.43
	06/01/2026	$44.82	$9.65	$18.40	$0.00	$72.87
	12/01/2026	$46.26	$9.65	$18.40	$0.00	$74.31
	06/01/2027	$47.71	$9.65	$18.40	$0.00	$75.76
	12/01/2027	$49.16	$9.65	$18.40	$0.00	$77.21
	06/01/2028	$50.66	$9.65	$18.40	$0.00	$78.71
	12/01/2028	$52.16	$9.65	$18.40	$0.00	$80.21
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2024	$39.28	$9.65	$17.80	$0.00	$66.73
	12/01/2024	$40.61	$9.65	$17.80	$0.00	$68.06
	06/01/2025	$42.00	$9.65	$17.80	$0.00	$69.45
	12/01/2025	$43.38	$9.65	$17.80	$0.00	$70.83
	06/01/2026	$44.82	$9.65	$17.80	$0.00	$72.27
	12/01/2026	$46.26	$9.65	$17.80	$0.00	$73.71
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
BOILER MAKER *BOILERMAKERS LOCAL 29*	01/01/2024	$48.12	$7.07	$20.60	$0.00	$75.79

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *BOILERMAKER - Local 29*

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	$31.28	$7.07	$13.22	$0.00	$51.57
2	65	$31.28	$7.07	$13.22	$0.00	$51.57
3	70	$33.68	$7.07	$14.23	$0.00	$54.98
4	75	$36.09	$7.07	$15.24	$0.00	$58.40
5	80	$38.50	$7.07	$16.25	$0.00	$61.82
6	85	$40.90	$7.07	$17.28	$0.00	$65.25
7	90	$43.31	$7.07	$18.28	$0.00	$68.66
8	95	$45.71	$7.07	$19.32	$0.00	$72.10

Notes:

Apprentice to Journeyworker Ratio:1:4

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) *BRICKLAYERS LOCAL 3 (WORCESTER)*	08/01/2024	$62.36	$11.49	$22.90	$0.00	$96.75
	02/01/2025	$63.66	$11.49	$22.90	$0.00	$98.05
	08/01/2025	$65.81	$11.49	$22.90	$0.00	$100.20
	02/01/2026	$67.16	$11.49	$22.90	$0.00	$101.55
	08/01/2026	$69.36	$11.49	$22.90	$0.00	$103.75
	02/01/2027	$70.76	$11.49	$22.90	$0.00	$105.15

Apprentice - *BRICK/PLASTER/CEMENT MASON - Local 3 Worcester*

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$31.18	$11.49	$22.90	$0.00	$65.57
2	60	$37.42	$11.49	$22.90	$0.00	$71.81
3	70	$43.65	$11.49	$22.90	$0.00	$78.04
4	80	$49.89	$11.49	$22.90	$0.00	$84.28
5	90	$56.12	$11.49	$22.90	$0.00	$90.51

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$31.83	$11.49	$22.90	$0.00	$66.22
2	60	$38.20	$11.49	$22.90	$0.00	$72.59
3	70	$44.56	$11.49	$22.90	$0.00	$78.95
4	80	$50.93	$11.49	$22.90	$0.00	$85.32
5	90	$57.29	$11.49	$22.90	$0.00	$91.68

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BULLDOZER/GRADER/SCRAPER *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$55.41	$15.30	$16.40	$0.00	$87.11
	12/01/2024	$56.85	$15.30	$16.40	$0.00	$88.55
	06/01/2025	$58.13	$15.30	$16.40	$0.00	$89.83
	12/01/2025	$59.57	$15.30	$16.40	$0.00	$91.27
	06/01/2026	$60.85	$15.30	$16.40	$0.00	$92.55
	12/01/2026	$62.29	$15.30	$16.40	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
CAISSON & UNDERPINNING BOTTOM MAN *LABORERS - FOUNDATION AND MARINE*	06/01/2024	$46.63	$9.65	$18.22	$0.00	$74.50
	12/01/2024	$48.10	$9.65	$18.22	$0.00	$75.97
	06/01/2025	$49.60	$9.65	$18.22	$0.00	$77.47
	12/01/2025	$51.10	$9.65	$18.22	$0.00	$78.97
	06/01/2026	$52.65	$9.65	$18.22	$0.00	$80.52
	12/01/2026	$54.15	$9.65	$18.22	$0.00	$82.02
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING LABORER *LABORERS - FOUNDATION AND MARINE*	06/01/2024	$45.48	$9.65	$18.22	$0.00	$73.35
	12/01/2024	$46.95	$9.65	$18.22	$0.00	$74.82
	06/01/2025	$48.45	$9.65	$18.22	$0.00	$76.32
	12/01/2025	$49.95	$9.65	$18.22	$0.00	$77.82
	06/01/2026	$51.50	$9.65	$18.22	$0.00	$79.37
	12/01/2026	$53.00	$9.65	$18.22	$0.00	$80.87
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN *LABORERS - FOUNDATION AND MARINE*	06/01/2024	$45.81	$9.65	$18.22	$0.00	$73.68
	12/01/2024	$47.28	$9.65	$18.22	$0.00	$75.15
	06/01/2025	$48.78	$9.65	$18.22	$0.00	$76.65
	12/01/2025	$50.28	$9.65	$18.22	$0.00	$78.15
	06/01/2026	$51.83	$9.65	$18.22	$0.00	$79.70
	12/01/2026	$53.33	$9.65	$18.22	$0.00	$81.20
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR *LABORERS - ZONE 2*	06/01/2024	$38.78	$9.65	$18.40	$0.00	$66.83
	12/01/2024	$40.11	$9.65	$18.40	$0.00	$68.16
	06/01/2025	$41.50	$9.65	$18.40	$0.00	$69.55
	12/01/2025	$42.88	$9.65	$18.40	$0.00	$70.93
	06/01/2026	$44.32	$9.65	$18.40	$0.00	$72.37
	12/01/2026	$45.76	$9.65	$18.40	$0.00	$73.81
	06/01/2027	$47.21	$9.65	$18.40	$0.00	$75.26
	12/01/2027	$48.66	$9.65	$18.40	$0.00	$76.71
	06/01/2028	$50.16	$9.65	$18.40	$0.00	$78.21
	12/01/2028	$51.66	$9.65	$18.40	$0.00	$79.71
For apprentice rates see "Apprentice- LABORER"						
CARPENTER *CARPENTERS -ZONE 2 (Eastern Massachusetts)*	09/01/2024	$48.37	$9.83	$19.97	$0.00	$78.17
	03/01/2025	$49.62	$9.83	$19.97	$0.00	$79.42
	09/01/2025	$50.87	$9.83	$19.97	$0.00	$80.67
	03/01/2026	$52.12	$9.83	$19.97	$0.00	$81.92
	09/01/2026	$53.37	$9.83	$19.97	$0.00	$83.17
	03/01/2027	$54.62	$9.83	$19.97	$0.00	$84.42

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *CARPENTER - Zone 2 Eastern MA*

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$21.77	$9.83	$1.73	$0.00	$33.33
2	45	$21.77	$9.83	$1.73	$0.00	$33.33
3	55	$26.60	$9.83	$3.40	$0.00	$39.83
4	55	$26.60	$9.83	$3.40	$0.00	$39.83
5	70	$33.86	$9.83	$16.51	$0.00	$60.20
6	70	$33.86	$9.83	$16.51	$0.00	$60.20
7	80	$38.70	$9.83	$18.24	$0.00	$66.77
8	80	$38.70	$9.83	$18.24	$0.00	$66.77

Effective Date - 03/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$22.33	$9.83	$1.73	$0.00	$33.89
2	45	$22.33	$9.83	$1.73	$0.00	$33.89
3	55	$27.29	$9.83	$3.40	$0.00	$40.52
4	55	$27.29	$9.83	$3.40	$0.00	$40.52
5	70	$34.73	$9.83	$16.51	$0.00	$61.07
6	70	$34.73	$9.83	$16.51	$0.00	$61.07
7	80	$39.70	$9.83	$18.24	$0.00	$67.77
8	80	$39.70	$9.83	$18.24	$0.00	$67.77

Notes:

Apprentice to Journeyworker Ratio:1:5

CARPENTER WOOD FRAME *CARPENTERS-ZONE 3 (Wood Frame)*	10/01/2023	$25.55	$7.02	$4.80	$0.00	$37.37
	10/01/2024	$26.65	$7.02	$4.80	$0.00	$38.47
	10/01/2025	$27.75	$7.02	$4.80	$0.00	$39.57
	10/01/2026	$28.85	$7.02	$4.80	$0.00	$40.67

All Aspects of New Wood Frame Work

Apprentice - *CARPENTER (Wood Frame) - Zone 3*

Effective Date - 10/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$15.33	$7.02	$0.00	$0.00	$22.35
2	60	$15.33	$7.02	$0.00	$0.00	$22.35
3	65	$16.61	$7.02	$1.00	$0.00	$24.63
4	70	$17.89	$7.02	$1.00	$0.00	$25.91
5	75	$19.16	$7.02	$4.80	$0.00	$30.98
6	80	$20.44	$7.02	$4.80	$0.00	$32.26
7	85	$21.72	$7.02	$4.80	$0.00	$33.54
8	90	$23.00	$7.02	$4.80	$0.00	$34.82

Effective Date - 10/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$15.99	$7.02	$0.00	$0.00	$23.01
2	60	$15.99	$7.02	$0.00	$0.00	$23.01
3	65	$17.32	$7.02	$1.00	$0.00	$25.34
4	70	$18.66	$7.02	$1.00	$0.00	$26.68
5	75	$19.99	$7.02	$4.80	$0.00	$31.81
6	80	$21.32	$7.02	$4.80	$0.00	$33.14
7	85	$22.65	$7.02	$4.80	$0.00	$34.47
8	90	$23.99	$7.02	$4.80	$0.00	$35.81

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 $18.52/ 3&4 $21.07/ 5&6 $28.70/ 7&8 $31.26

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING *BRICKLAYERS LOCAL 3 (WORCESTER)*	01/01/2024	$49.33	$13.00	$23.57	$1.30	$87.20

Apprentice - *CEMENT MASONRY/PLASTERING - Worcester*

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.67	$13.00	$15.93	$0.00	$53.60
2	60	$29.60	$13.00	$18.57	$1.30	$62.47
3	65	$32.06	$13.00	$19.57	$1.30	$65.93
4	70	$34.53	$13.00	$20.57	$1.30	$69.40
5	75	$37.00	$13.00	$21.57	$1.30	$72.87
6	80	$39.46	$13.00	$22.57	$1.30	$76.33
7	90	$44.40	$13.00	$23.57	$1.30	$82.27

Notes:

Steps 3,4 are 500 hrs. All other steps are 1,000 hrs.

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CHAIN SAW OPERATOR *LABORERS - ZONE 2*	06/01/2024	$38.78	$9.65	$18.40	$0.00	$66.83
	12/01/2024	$40.11	$9.65	$18.40	$0.00	$68.16
	06/01/2025	$41.50	$9.65	$18.40	$0.00	$69.55
	12/01/2025	$42.88	$9.65	$18.40	$0.00	$70.93
	06/01/2026	$44.32	$9.65	$18.40	$0.00	$72.37
	12/01/2026	$45.76	$9.65	$18.40	$0.00	$73.81
	06/01/2027	$47.21	$9.65	$18.40	$0.00	$75.26
	12/01/2027	$48.66	$9.65	$18.40	$0.00	$76.71
	06/01/2028	$50.16	$9.65	$18.40	$0.00	$78.21
	12/01/2028	$51.66	$9.65	$18.40	$0.00	$79.71
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$57.15	$15.30	$16.40	$0.00	$88.85
	12/01/2024	$58.63	$15.30	$16.40	$0.00	$90.33
	06/01/2025	$59.96	$15.30	$16.40	$0.00	$91.66
	12/01/2025	$61.43	$15.30	$16.40	$0.00	$93.13
	06/01/2026	$62.76	$15.30	$16.40	$0.00	$94.46
	12/01/2026	$64.24	$15.30	$16.40	$0.00	$95.94
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
COMPRESSOR OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$36.17	$15.30	$16.40	$0.00	$67.87
	12/01/2024	$37.12	$15.30	$16.40	$0.00	$68.82
	06/01/2025	$37.97	$15.30	$16.40	$0.00	$69.67
	12/01/2025	$38.92	$15.30	$16.40	$0.00	$70.62
	06/01/2026	$39.78	$15.30	$16.40	$0.00	$71.48
	12/01/2026	$40.73	$15.30	$16.40	$0.00	$72.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) *PAINTERS LOCAL 35 - ZONE 2*	07/01/2024	$57.26	$9.95	$23.95	$0.00	$91.16
	01/01/2025	$58.46	$9.95	$23.95	$0.00	$92.36

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.63	$9.95	$0.00	$0.00	$38.58
2	55	$31.49	$9.95	$6.66	$0.00	$48.10
3	60	$34.36	$9.95	$7.26	$0.00	$51.57
4	65	$37.22	$9.95	$7.87	$0.00	$55.04
5	70	$40.08	$9.95	$20.32	$0.00	$70.35
6	75	$42.95	$9.95	$20.93	$0.00	$73.83
7	80	$45.81	$9.95	$21.53	$0.00	$77.29
8	90	$51.53	$9.95	$22.74	$0.00	$84.22

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$29.23	$9.95	$0.00	$0.00	$39.18
2	55	$32.15	$9.95	$6.66	$0.00	$48.76
3	60	$35.08	$9.95	$7.26	$0.00	$52.29
4	65	$38.00	$9.95	$7.87	$0.00	$55.82
5	70	$40.92	$9.95	$20.32	$0.00	$71.19
6	75	$43.85	$9.95	$20.93	$0.00	$74.73
7	80	$46.77	$9.95	$21.53	$0.00	$78.25
8	90	$52.61	$9.95	$22.74	$0.00	$85.30

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN *LABORERS - ZONE 2*	12/01/2023	$44.48	$9.65	$18.07	$0.00	$72.20

For apprentice rates see "Apprentice- LABORER"

DEMO: BACKHOE/LOADER/HAMMER OPERATOR *LABORERS - ZONE 2*	12/01/2023	$45.48	$9.65	$18.07	$0.00	$73.20

For apprentice rates see "Apprentice- LABORER"

DEMO: BURNERS *LABORERS - ZONE 2*	12/01/2023	$45.23	$9.65	$18.07	$0.00	$72.95

For apprentice rates see "Apprentice- LABORER"

DEMO: CONCRETE CUTTER/SAWYER *LABORERS - ZONE 2*	12/01/2023	$45.48	$9.65	$18.07	$0.00	$73.20

For apprentice rates see "Apprentice- LABORER"

DEMO: JACKHAMMER OPERATOR *LABORERS - ZONE 2*	12/01/2023	$45.23	$9.65	$18.07	$0.00	$72.95

For apprentice rates see "Apprentice- LABORER"

DEMO: WRECKING LABORER *LABORERS - ZONE 2*	12/01/2023	$44.48	$9.65	$18.07	$0.00	$72.20

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DIRECTIONAL DRILL MACHINE OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$55.41	$15.30	$16.40	$0.00	$87.11
	12/01/2024	$56.85	$15.30	$16.40	$0.00	$88.55
	06/01/2025	$58.13	$15.30	$16.40	$0.00	$89.83
	12/01/2025	$59.57	$15.30	$16.40	$0.00	$91.27
	06/01/2026	$60.85	$15.30	$16.40	$0.00	$92.55
	12/01/2026	$62.29	$15.30	$16.40	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$68.70	$9.40	$23.12	$0.00	$101.22
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$73.60	$9.40	$23.12	$0.00	$106.12
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) *DRAWBRIDGE - SEIU LOCAL 888*	07/01/2020	$26.77	$6.67	$3.93	$0.16	$37.53
ELECTRICIAN *ELECTRICIANS LOCAL 96*	09/01/2024	$47.05	$13.99	$19.22	$0.00	$80.26
	09/07/2025	$48.16	$14.98	$19.60	$0.00	$82.74
	09/06/2026	$49.38	$15.96	$20.00	$0.00	$85.34

Apprentice - *ELECTRICIAN - Local 96*

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$18.82	$13.99	$0.56	$0.00	$33.37
2	45	$21.17	$13.99	$0.64	$0.00	$35.80
3	48	$22.58	$13.99	$15.79	$0.00	$52.36
4	55	$25.88	$13.99	$16.26	$0.00	$56.13
5	65	$30.58	$13.99	$16.91	$0.00	$61.48
6	80	$37.64	$13.99	$17.90	$0.00	$69.53

Effective Date - 09/07/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$19.26	$14.98	$0.58	$0.00	$34.82
2	45	$21.67	$14.98	$0.65	$0.00	$37.30
3	48	$23.12	$14.98	$16.09	$0.00	$54.19
4	55	$26.49	$14.98	$16.57	$0.00	$58.04
5	65	$31.30	$14.98	$17.25	$0.00	$63.53
6	80	$38.53	$14.98	$18.26	$0.00	$71.77

Notes:

Steps 1-2 are 1000 hrs; Steps 3-6 are 1500 hrs.

Apprentice to Journeyworker Ratio:2:3***

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ELEVATOR CONSTRUCTOR *ELEVATOR CONSTRUCTORS LOCAL 41*	01/01/2024	$61.98	$16.18	$20.96	$0.00	$99.12
	01/01/2025	$62.83	$16.28	$21.36	$0.00	$100.47
	01/01/2026	$63.68	$16.38	$21.76	$0.00	$101.82
	01/01/2027	$64.53	$16.48	$22.16	$0.00	$103.17

Apprentice - *ELEVATOR CONSTRUCTOR - Local 41*

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$30.99	$16.18	$0.00	$0.00	$47.17
2	55	$34.09	$16.18	$20.96	$0.00	$71.23
3	65	$40.29	$16.18	$20.96	$0.00	$77.43
4	70	$43.39	$16.18	$20.96	$0.00	$80.53
5	80	$49.58	$16.18	$20.96	$0.00	$86.72

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$31.42	$16.28	$0.00	$0.00	$47.70
2	55	$34.56	$16.28	$21.36	$0.00	$72.20
3	65	$40.84	$16.28	$21.36	$0.00	$78.48
4	70	$43.98	$16.28	$21.36	$0.00	$81.62
5	80	$50.26	$16.28	$21.36	$0.00	$87.90

Notes:

Steps 1-2 are 6 mos.; Steps 3-5 are 1 year

Apprentice to Journeyworker Ratio:1:1

ELEVATOR CONSTRUCTOR HELPER *ELEVATOR CONSTRUCTORS LOCAL 41*	01/01/2024	$43.39	$16.18	$20.96	$0.00	$80.53
	01/01/2025	$43.98	$16.28	$21.36	$0.00	$81.62
	01/01/2026	$44.58	$16.38	$21.76	$0.00	$82.72
	01/01/2027	$45.17	$16.48	$22.16	$0.00	$83.81
For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"						
FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2024	$38.78	$9.65	$17.80	$0.00	$66.23
	12/01/2024	$40.11	$9.65	$17.80	$0.00	$67.56
	06/01/2025	$41.50	$9.65	$17.80	$0.00	$68.95
	12/01/2025	$42.88	$9.65	$17.80	$0.00	$70.33
	06/01/2026	$44.32	$9.65	$17.80	$0.00	$71.77
	12/01/2026	$45.76	$9.65	$17.80	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	05/01/2024	$50.79	$15.00	$16.40	$0.00	$82.19
	11/01/2024	$52.08	$15.00	$16.40	$0.00	$83.48
	05/01/2025	$53.52	$15.00	$16.40	$0.00	$84.92
	11/01/2025	$54.81	$15.00	$16.40	$0.00	$86.21
	05/01/2026	$56.25	$15.00	$16.40	$0.00	$87.65
	11/01/2026	$57.54	$15.00	$16.40	$0.00	$88.94
	05/01/2027	$58.97	$15.00	$16.40	$0.00	$90.37
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	05/01/2024	$52.37	$15.00	$16.40	$0.00	$83.77
	11/01/2024	$53.67	$15.00	$16.40	$0.00	$85.07
	05/01/2025	$55.12	$15.00	$16.40	$0.00	$86.52
	11/01/2025	$56.42	$15.00	$16.40	$0.00	$87.82
	05/01/2026	$57.87	$15.00	$16.40	$0.00	$89.27
	11/01/2026	$59.17	$15.00	$16.40	$0.00	$90.57
	05/01/2027	$60.62	$15.00	$16.40	$0.00	$92.02
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	05/01/2024	$24.91	$15.00	$16.40	$0.00	$56.31
	11/01/2024	$25.67	$15.00	$16.40	$0.00	$57.07
	05/01/2025	$26.52	$15.00	$16.40	$0.00	$57.92
	11/01/2025	$27.28	$15.00	$16.40	$0.00	$58.68
	05/01/2026	$28.13	$15.00	$16.40	$0.00	$59.53
	11/01/2026	$28.89	$15.00	$16.40	$0.00	$60.29
	05/01/2027	$29.74	$15.00	$16.40	$0.00	$61.14
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER *ELECTRICIANS LOCAL 96*	09/01/2024	$47.05	$13.99	$19.22	$0.00	$80.26
	09/07/2025	$48.16	$14.98	$19.60	$0.00	$82.74
	09/06/2026	$49.38	$15.96	$20.00	$0.00	$85.34
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIRE ALARM REPAIR / MAINT/COMMISSIONING *ELECTRICIANS LOCAL 96*	09/01/2024	$47.05	$13.99	$19.22	$0.00	$80.26
	09/07/2025	$48.16	$14.98	$19.60	$0.00	$82.74
	09/06/2026	$49.38	$15.96	$20.00	$0.00	$85.34
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIREMAN (ASST. ENGINEER) *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$45.23	$15.30	$16.40	$0.00	$76.93
	12/01/2024	$46.41	$15.30	$16.40	$0.00	$78.11
	06/01/2025	$47.47	$15.30	$16.40	$0.00	$79.17
	12/01/2025	$48.64	$15.30	$16.40	$0.00	$80.34
	06/01/2026	$49.70	$15.30	$16.40	$0.00	$81.40
	12/01/2026	$50.88	$15.30	$16.40	$0.00	$82.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FLAGGER & SIGNALER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2024	$27.01	$9.65	$17.80	$0.00	$54.46
	12/01/2024	$27.01	$9.65	$17.80	$0.00	$54.46
	06/01/2025	$28.09	$9.65	$17.80	$0.00	$55.54
	12/01/2025	$28.09	$9.65	$17.80	$0.00	$55.54
	06/01/2026	$29.21	$9.65	$17.80	$0.00	$56.66
	12/01/2026	$29.21	$9.65	$17.80	$0.00	$56.66
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
FLOORCOVERER *FLOORCOVERERS LOCAL 2168 ZONE II*	03/01/2024	$49.47	$8.83	$20.27	$0.00	$78.57

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *FLOORCOVERER - Local 2168 Zone II*

Effective Date - 03/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.74	$8.83	$1.76	$0.00	$35.33
2	55	$27.21	$8.83	$1.76	$0.00	$37.80
3	60	$29.68	$8.83	$3.52	$0.00	$42.03
4	65	$32.16	$8.83	$3.52	$0.00	$44.51
5	70	$34.63	$8.83	$16.75	$0.00	$60.21
6	75	$37.10	$8.83	$16.75	$0.00	$62.68
7	80	$39.58	$8.83	$18.51	$0.00	$66.92
8	85	$42.05	$8.83	$18.51	$0.00	$69.39

Notes: Steps are 750 hrs.
% After 10/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)
Step 1&2 $32.63/ 3&4 $39.28/ 5&6 $59.86/ 7&8 $66.52

Apprentice to Journeyworker Ratio:1:1

FORK LIFT/CHERRY PICKER *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$56.03	$15.30	$16.40	$0.00	$87.73
	12/01/2024	$57.48	$15.30	$16.40	$0.00	$89.18
	06/01/2025	$58.78	$15.30	$16.40	$0.00	$90.48
	12/01/2025	$60.23	$15.30	$16.40	$0.00	$91.93
	06/01/2026	$61.53	$15.30	$16.40	$0.00	$93.23
	12/01/2026	$62.98	$15.30	$16.40	$0.00	$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GENERATOR/LIGHTING PLANT/HEATERS *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$36.17	$15.30	$16.40	$0.00	$67.87
	12/01/2024	$37.12	$15.30	$16.40	$0.00	$68.82
	06/01/2025	$37.97	$15.30	$16.40	$0.00	$69.67
	12/01/2025	$38.92	$15.30	$16.40	$0.00	$70.62
	06/01/2026	$39.78	$15.30	$16.40	$0.00	$71.48
	12/01/2026	$40.73	$15.30	$16.40	$0.00	$72.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) *GLAZIERS LOCAL 35 (ZONE 2)*	07/01/2024	$46.76	$9.95	$23.95	$0.00	$80.66
	01/01/2025	$47.96	$9.95	$23.95	$0.00	$81.86

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *GLAZIER - Local 35 Zone 2*

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.38	$9.95	$0.00	$0.00	$33.33
2	55	$25.72	$9.95	$6.66	$0.00	$42.33
3	60	$28.06	$9.95	$7.26	$0.00	$45.27
4	65	$30.39	$9.95	$7.87	$0.00	$48.21
5	70	$32.73	$9.95	$20.32	$0.00	$63.00
6	75	$35.07	$9.95	$20.93	$0.00	$65.95
7	80	$37.41	$9.95	$21.53	$0.00	$68.89
8	90	$42.08	$9.95	$22.74	$0.00	$74.77

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.98	$9.95	$0.00	$0.00	$33.93
2	55	$26.38	$9.95	$6.66	$0.00	$42.99
3	60	$28.78	$9.95	$7.26	$0.00	$45.99
4	65	$31.17	$9.95	$7.87	$0.00	$48.99
5	70	$33.57	$9.95	$20.32	$0.00	$63.84
6	75	$35.97	$9.95	$20.93	$0.00	$66.85
7	80	$38.37	$9.95	$21.53	$0.00	$69.85
8	90	$43.16	$9.95	$22.74	$0.00	$75.85

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

HOISTING ENGINEER/CRANES/GRADALLS *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$56.03	$15.30	$16.40	$0.00	$87.73
	12/01/2024	$57.48	$15.30	$16.40	$0.00	$89.18
	06/01/2025	$58.78	$15.30	$16.40	$0.00	$90.48
	12/01/2025	$60.23	$15.30	$16.40	$0.00	$91.93
	06/01/2026	$61.53	$15.30	$16.40	$0.00	$93.23
	12/01/2026	$62.98	$15.30	$16.40	$0.00	$94.68

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *OPERATING ENGINEERS - Local 4*

Effective Date - 06/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$30.82	$15.30	$0.00	$0.00	$46.12
2	60	$33.62	$15.30	$16.40	$0.00	$65.32
3	65	$36.42	$15.30	$16.40	$0.00	$68.12
4	70	$39.22	$15.30	$16.40	$0.00	$70.92
5	75	$42.02	$15.30	$16.40	$0.00	$73.72
6	80	$44.82	$15.30	$16.40	$0.00	$76.52
7	85	$47.63	$15.30	$16.40	$0.00	$79.33
8	90	$50.43	$15.30	$16.40	$0.00	$82.13

Effective Date - 12/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$31.61	$0.00	$0.00	$0.00	$31.61
2	60	$34.49	$15.30	$16.40	$0.00	$66.19
3	65	$37.36	$15.30	$16.40	$0.00	$69.06
4	70	$40.24	$15.30	$16.40	$0.00	$71.94
5	75	$43.11	$15.30	$16.40	$0.00	$74.81
6	80	$45.98	$15.30	$16.40	$0.00	$77.68
7	85	$48.86	$15.30	$16.40	$0.00	$80.56
8	90	$51.73	$15.30	$16.40	$0.00	$83.43

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) *SHEETMETAL WORKERS LOCAL 63*	07/01/2024	$40.98	$12.20	$18.74	$2.13	$74.05
	01/01/2025	$42.23	$12.20	$18.74	$2.13	$75.30
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (ELECTRICAL CONTROLS) *ELECTRICIANS LOCAL 96*	09/01/2024	$47.05	$13.99	$19.22	$0.00	$80.26
	09/07/2025	$48.16	$14.98	$19.60	$0.00	$82.74
	09/06/2026	$49.38	$15.96	$20.00	$0.00	$85.34
For apprentice rates see "Apprentice- ELECTRICIAN"						
HVAC (TESTING AND BALANCING - AIR) *SHEETMETAL WORKERS LOCAL 63*	07/01/2024	$40.98	$12.20	$18.74	$2.13	$74.05
	01/01/2025	$42.23	$12.20	$18.74	$2.13	$75.30
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (TESTING AND BALANCING -WATER) *PLUMBERS LOCAL 4*	09/01/2024	$55.35	$9.90	$17.42	$0.00	$82.67
	03/01/2025	$56.75	$9.90	$17.42	$0.00	$84.07
	09/01/2025	$58.15	$9.90	$17.42	$0.00	$85.47
	03/01/2026	$59.55	$9.90	$17.42	$0.00	$86.87
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HVAC MECHANIC *PLUMBERS LOCAL 4*	09/01/2024	$55.35	$9.90	$17.42	$0.00	$82.67
	03/01/2025	$56.75	$9.90	$17.42	$0.00	$84.07
	09/01/2025	$58.15	$9.90	$17.42	$0.00	$85.47
	03/01/2026	$59.55	$9.90	$17.42	$0.00	$86.87
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HYDRAULIC DRILLS *LABORERS - ZONE 2*	06/01/2024	$39.28	$9.65	$18.40	$0.00	$67.33
	12/01/2024	$40.61	$9.65	$18.40	$0.00	$68.66
	06/01/2025	$42.00	$9.65	$18.40	$0.00	$70.05
	12/01/2025	$43.38	$9.65	$18.40	$0.00	$71.43
	06/01/2026	$44.82	$9.65	$18.40	$0.00	$72.87
	12/01/2026	$46.26	$9.65	$18.40	$0.00	$74.31
	06/01/2027	$47.71	$9.65	$18.40	$0.00	$75.76
	12/01/2027	$49.16	$9.65	$18.40	$0.00	$77.21
	06/01/2028	$50.66	$9.65	$18.40	$0.00	$78.71
	12/01/2028	$52.16	$9.65	$18.40	$0.00	$80.21
For apprentice rates see "Apprentice- LABORER"						
HYDRAULIC DRILLS (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2024	$39.28	$9.65	$17.80	$0.00	$66.73
	12/01/2024	$40.61	$9.65	$17.80	$0.00	$68.06
	06/01/2025	$42.00	$9.65	$17.80	$0.00	$69.45
	12/01/2025	$43.38	$9.65	$17.80	$0.00	$70.83
	06/01/2026	$44.82	$9.65	$17.80	$0.00	$72.27
	12/01/2026	$46.26	$9.65	$17.80	$0.00	$73.71
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
INSULATOR (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (WORCESTER)*	09/01/2024	$51.23	$14.75	$19.61	$0.00	$85.59
	09/01/2025	$54.31	$14.75	$19.61	$0.00	$88.67
	09/01/2026	$57.38	$14.75	$19.61	$0.00	$91.74

Apprentice - *ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Worcester*

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.62	$14.75	$14.32	$0.00	$54.69
2	60	$30.74	$14.75	$15.37	$0.00	$60.86
3	70	$35.86	$14.75	$16.43	$0.00	$67.04
4	80	$40.98	$14.75	$17.49	$0.00	$73.22

Effective Date - 09/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.16	$14.75	$14.32	$0.00	$56.23
2	60	$32.59	$14.75	$15.37	$0.00	$62.71
3	70	$38.02	$14.75	$16.43	$0.00	$69.20
4	80	$43.45	$14.75	$17.49	$0.00	$75.69

Notes:
Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
IRONWORKER/WELDER *IRONWORKERS LOCAL 7 (WORCESTER AREA)*	03/16/2024	$53.67	$8.35	$26.70	$0.00	$88.72

Apprentice - *IRONWORKER - Local 7 Worcester*

Effective Date - 03/16/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$32.20	$8.35	$26.70	$0.00	$67.25
2	70	$37.57	$8.35	$26.70	$0.00	$72.62
3	75	$40.25	$8.35	$26.70	$0.00	$75.30
4	80	$42.94	$8.35	$26.70	$0.00	$77.99
5	85	$45.62	$8.35	$26.70	$0.00	$80.67
6	90	$48.30	$8.35	$26.70	$0.00	$83.35

Notes:

Apprentice to Journeyworker Ratio:1:4

JACKHAMMER & PAVING BREAKER OPERATOR *LABORERS - ZONE 2*	06/01/2024	$38.78	$9.65	$18.40	$0.00	$66.83
	12/01/2024	$40.11	$9.65	$18.40	$0.00	$68.16
	06/01/2025	$41.50	$9.65	$18.40	$0.00	$69.55
	12/01/2025	$42.88	$9.65	$18.40	$0.00	$70.93
	06/01/2026	$44.32	$9.65	$18.40	$0.00	$72.37
	12/01/2026	$45.76	$9.65	$18.40	$0.00	$73.81
	06/01/2027	$47.21	$9.65	$18.40	$0.00	$75.26
	12/01/2027	$48.66	$9.65	$18.40	$0.00	$76.71
	06/01/2028	$50.16	$9.65	$18.40	$0.00	$78.21
	12/01/2028	$51.66	$9.65	$18.40	$0.00	$79.71
For apprentice rates see "Apprentice- LABORER"						
LABORER *LABORERS - ZONE 2*	06/01/2024	$38.53	$9.65	$18.40	$0.00	$66.58
	12/01/2024	$39.86	$9.65	$18.40	$0.00	$67.91
	06/01/2025	$41.25	$9.65	$18.40	$0.00	$69.30
	12/01/2025	$42.63	$9.65	$18.40	$0.00	$70.68
	06/01/2026	$44.07	$9.65	$18.40	$0.00	$72.12
	12/01/2026	$45.51	$9.65	$18.40	$0.00	$73.56
	06/01/2027	$46.96	$9.65	$18.40	$0.00	$75.01
	12/01/2027	$48.41	$9.65	$18.40	$0.00	$76.46
	06/01/2028	$49.91	$9.65	$18.40	$0.00	$77.96
	12/01/2028	$51.41	$9.65	$18.40	$0.00	$79.46

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *LABORER - Zone 2*

Effective Date - 06/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$23.12	$9.65	$18.40	$0.00	$51.17
2	70	$26.97	$9.65	$18.40	$0.00	$55.02
3	80	$30.82	$9.65	$18.40	$0.00	$58.87
4	90	$34.68	$9.65	$18.40	$0.00	$62.73

Effective Date - 12/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$23.92	$9.65	$18.40	$0.00	$51.97
2	70	$27.90	$9.65	$18.40	$0.00	$55.95
3	80	$31.89	$9.65	$18.40	$0.00	$59.94
4	90	$35.87	$9.65	$18.40	$0.00	$63.92

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2024	$38.53	$9.65	$17.80	$0.00	$65.98
	12/01/2024	$39.86	$9.65	$17.80	$0.00	$67.31
	06/01/2025	$41.25	$9.65	$17.80	$0.00	$68.70
	12/01/2025	$42.63	$9.65	$17.80	$0.00	$70.08
	06/01/2026	$44.07	$9.65	$17.80	$0.00	$71.52
	12/01/2026	$45.51	$9.65	$17.80	$0.00	$72.96

Apprentice - *LABORER (Heavy & Highway) - Zone 2*

Effective Date - 06/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$23.12	$9.65	$17.80	$0.00	$50.57
2	70	$26.97	$9.65	$17.80	$0.00	$54.42
3	80	$30.82	$9.65	$17.80	$0.00	$58.27
4	90	$34.68	$9.65	$17.80	$0.00	$62.13

Effective Date - 12/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$23.92	$9.65	$17.80	$0.00	$51.37
2	70	$27.90	$9.65	$17.80	$0.00	$55.35
3	80	$31.89	$9.65	$17.80	$0.00	$59.34
4	90	$35.87	$9.65	$17.80	$0.00	$63.32

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: CARPENTER TENDER *LABORERS - ZONE 2*	06/01/2024	$38.53	$9.65	$18.40	$0.00	$66.58
	12/01/2024	$39.86	$9.65	$18.40	$0.00	$67.91
	06/01/2025	$41.25	$9.65	$18.40	$0.00	$69.30
	12/01/2025	$42.63	$9.65	$18.40	$0.00	$70.68
	06/01/2026	$44.07	$9.65	$18.40	$0.00	$72.12
	12/01/2026	$45.51	$9.65	$18.40	$0.00	$73.56
	06/01/2027	$46.96	$9.65	$18.40	$0.00	$75.01
	12/01/2027	$48.41	$9.65	$18.40	$0.00	$76.46
	06/01/2028	$49.91	$9.65	$18.40	$0.00	$77.96
	12/01/2028	$51.41	$9.65	$18.40	$0.00	$79.46
For apprentice rates see "Apprentice- LABORER"						
LABORER: CEMENT FINISHER TENDER *LABORERS - ZONE 2*	06/01/2024	$38.53	$9.65	$18.40	$0.00	$66.58
	12/01/2024	$39.86	$9.65	$18.40	$0.00	$67.91
	06/01/2025	$41.25	$9.65	$18.40	$0.00	$69.30
	12/01/2025	$42.63	$9.65	$18.40	$0.00	$70.68
	06/01/2026	$44.07	$9.65	$18.40	$0.00	$72.12
	12/01/2026	$45.51	$9.65	$18.40	$0.00	$73.56
	06/01/2027	$46.96	$9.65	$18.40	$0.00	$75.01
	12/01/2027	$48.41	$9.65	$18.40	$0.00	$76.46
	06/01/2028	$49.91	$9.65	$18.40	$0.00	$77.96
	12/01/2028	$51.41	$9.65	$18.40	$0.00	$79.46
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER *LABORERS - ZONE 2*	12/01/2023	$37.95	$9.65	$17.20	$0.00	$64.80
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER *LABORERS - ZONE 2*	06/01/2024	$38.78	$9.65	$18.40	$0.00	$66.83
	12/01/2024	$40.11	$9.65	$18.40	$0.00	$68.16
	06/01/2025	$41.50	$9.65	$18.40	$0.00	$69.55
	12/01/2025	$42.88	$9.65	$18.40	$0.00	$70.93
	06/01/2026	$44.32	$9.65	$18.40	$0.00	$72.37
	12/01/2026	$45.76	$9.65	$18.40	$0.00	$73.81
	06/01/2027	$47.21	$9.65	$18.40	$0.00	$75.26
	12/01/2027	$48.66	$9.65	$18.40	$0.00	$76.71
	06/01/2028	$50.16	$9.65	$18.40	$0.00	$78.21
	12/01/2028	$51.66	$9.65	$18.40	$0.00	$79.71
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2024	$38.78	$9.65	$17.80	$0.00	$66.23
	12/01/2024	$40.11	$9.65	$17.80	$0.00	$67.56
	06/01/2025	$41.50	$9.65	$17.80	$0.00	$68.95
	12/01/2025	$42.88	$9.65	$17.80	$0.00	$70.33
	06/01/2026	$44.32	$9.65	$17.80	$0.00	$71.77
	12/01/2026	$45.76	$9.65	$17.80	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: MULTI-TRADE TENDER *LABORERS - ZONE 2*	06/01/2024	$38.53	$9.65	$18.40	$0.00	$66.58
	12/01/2024	$39.86	$9.65	$18.40	$0.00	$67.91
	06/01/2025	$41.25	$9.65	$18.40	$0.00	$69.30
	12/01/2025	$42.63	$9.65	$18.40	$0.00	$70.68
	06/01/2026	$44.07	$9.65	$18.40	$0.00	$72.12
	12/01/2026	$45.51	$9.65	$18.40	$0.00	$73.56
	06/01/2027	$46.96	$9.65	$18.40	$0.00	$75.01
	12/01/2027	$48.41	$9.65	$18.40	$0.00	$76.46
	06/01/2028	$49.91	$9.65	$18.40	$0.00	$77.96
	12/01/2028	$51.41	$9.65	$18.40	$0.00	$79.46
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER *LABORERS - ZONE 2*	06/01/2024	$38.53	$9.65	$18.40	$0.00	$66.58
	12/01/2024	$39.86	$9.65	$18.40	$0.00	$67.91
	06/01/2025	$41.25	$9.65	$18.40	$0.00	$69.30
	12/01/2025	$42.63	$9.65	$18.40	$0.00	$70.68
	06/01/2026	$44.07	$9.65	$18.40	$0.00	$72.12
	12/01/2026	$45.51	$9.65	$18.40	$0.00	$73.56
	06/01/2027	$46.96	$9.65	$18.40	$0.00	$75.01
	12/01/2027	$48.41	$9.65	$18.40	$0.00	$76.46
	06/01/2028	$49.91	$9.65	$18.40	$0.00	$77.96
	12/01/2028	$51.41	$9.65	$18.40	$0.00	$79.46
This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR *LABORERS - ZONE 2*	06/01/2024	$38.78	$9.65	$18.40	$0.00	$66.83
	12/01/2024	$40.11	$9.65	$18.40	$0.00	$68.16
	06/01/2025	$41.50	$9.65	$18.40	$0.00	$69.55
	12/01/2025	$42.88	$9.65	$18.40	$0.00	$70.93
	06/01/2026	$44.32	$9.65	$18.40	$0.00	$72.37
	12/01/2026	$45.76	$9.65	$18.40	$0.00	$73.81
	06/01/2027	$47.21	$9.65	$18.40	$0.00	$75.26
	12/01/2027	$48.66	$9.65	$18.40	$0.00	$76.71
	06/01/2028	$50.16	$9.65	$18.40	$0.00	$78.21
	12/01/2028	$51.66	$9.65	$18.40	$0.00	$79.71
For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2024	$38.78	$9.65	$17.80	$0.00	$66.23
	12/01/2024	$40.11	$9.65	$17.80	$0.00	$67.56
	06/01/2025	$41.50	$9.65	$17.80	$0.00	$68.95
	12/01/2025	$42.88	$9.65	$17.80	$0.00	$70.33
	06/01/2026	$44.32	$9.65	$17.80	$0.00	$71.77
	12/01/2026	$45.76	$9.65	$17.80	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
MARBLE & TILE FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	08/01/2024	$49.32	$11.49	$21.62	$0.00	$82.43
	02/01/2025	$50.36	$11.49	$21.62	$0.00	$83.47
	08/01/2025	$52.08	$11.49	$21.62	$0.00	$85.19
	02/01/2026	$53.16	$11.49	$21.62	$0.00	$86.27
	08/01/2026	$54.92	$11.49	$21.62	$0.00	$88.03
	02/01/2027	$56.04	$11.49	$21.62	$0.00	$89.15

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MARBLE & TILE FINISHER - Local 3 Marble & Tile*

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.66	$11.49	$21.62	$0.00	$57.77
2	60	$29.59	$11.49	$21.62	$0.00	$62.70
3	70	$34.52	$11.49	$21.62	$0.00	$67.63
4	80	$39.46	$11.49	$21.62	$0.00	$72.57
5	90	$44.39	$11.49	$21.62	$0.00	$77.50

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.18	$11.49	$21.62	$0.00	$58.29
2	60	$30.22	$11.49	$21.62	$0.00	$63.33
3	70	$35.25	$11.49	$21.62	$0.00	$68.36
4	80	$40.29	$11.49	$21.62	$0.00	$73.40
5	90	$45.32	$11.49	$21.62	$0.00	$78.43

Notes:

Apprentice to Journeyworker Ratio:1:3

MARBLE MASONS,TILELAYERS & TERRAZZO MECH *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	08/01/2024	$64.52	$11.49	$23.56	$0.00	$99.57
	02/01/2025	$65.82	$11.49	$23.56	$0.00	$100.87
	08/01/2025	$67.97	$11.49	$23.56	$0.00	$103.02
	02/01/2026	$69.32	$11.49	$23.56	$0.00	$104.37
	08/01/2026	$71.52	$11.49	$23.56	$0.00	$106.57
	02/01/2027	$72.92	$11.49	$23.56	$0.00	$107.97

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile*

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$32.26	$11.49	$23.56	$0.00	$67.31
2	60	$38.71	$11.49	$23.56	$0.00	$73.76
3	70	$45.16	$11.49	$23.56	$0.00	$80.21
4	80	$51.62	$11.49	$23.56	$0.00	$86.67
5	90	$58.07	$11.49	$23.56	$0.00	$93.12

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$32.91	$11.49	$23.56	$0.00	$67.96
2	60	$39.49	$11.49	$23.56	$0.00	$74.54
3	70	$46.07	$11.49	$23.56	$0.00	$81.12
4	80	$52.66	$11.49	$23.56	$0.00	$87.71
5	90	$59.24	$11.49	$23.56	$0.00	$94.29

Notes:

Apprentice to Journeyworker Ratio:1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES) *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$55.41	$15.30	$16.40	$0.00	$87.11
	12/01/2024	$56.85	$15.30	$16.40	$0.00	$88.55
	06/01/2025	$58.13	$15.30	$16.40	$0.00	$89.83
	12/01/2025	$59.57	$15.30	$16.40	$0.00	$91.27
	06/01/2026	$60.85	$15.30	$16.40	$0.00	$92.55
	12/01/2026	$62.29	$15.30	$16.40	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MECHANICS MAINTENANCE *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$55.41	$15.30	$16.40	$0.00	$87.11
	12/01/2024	$56.85	$15.30	$16.40	$0.00	$88.55
	06/01/2025	$58.13	$15.30	$16.40	$0.00	$89.83
	12/01/2025	$59.57	$15.30	$16.40	$0.00	$91.27
	06/01/2026	$60.85	$15.30	$16.40	$0.00	$92.55
	12/01/2026	$62.29	$15.30	$16.40	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MILLWRIGHT (Zone 3) *MILLWRIGHTS LOCAL 1121 - Zone 3*	01/01/2024	$41.20	$10.08	$21.22	$0.00	$72.50
	01/06/2025	$43.48	$10.08	$21.22	$0.00	$74.78
	01/05/2026	$45.76	$10.08	$21.22	$0.00	$77.06

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MILLWRIGHT - Local 1121 Zone 3*

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$22.66	$10.08	$5.36	$0.00	$38.10
2	65	$26.78	$10.08	$6.34	$0.00	$43.20
3	75	$30.90	$10.08	$18.78	$0.00	$59.76
4	85	$35.02	$10.08	$19.76	$0.00	$64.86

Effective Date - 01/06/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$23.91	$10.08	$5.36	$0.00	$39.35
2	65	$28.26	$10.08	$6.34	$0.00	$44.68
3	75	$32.61	$10.08	$18.78	$0.00	$61.47
4	85	$36.96	$10.08	$19.76	$0.00	$66.80

Notes: Step 1&2 Appr. indentured after 1/6/2020 receive no pension, but do receive annuity. (Step 1 $5.72, Step 2 $6.66)
Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:4

MORTAR MIXER *LABORERS - ZONE 2*	06/01/2024	$38.78	$9.65	$18.40	$0.00	$66.83
	12/01/2024	$40.11	$9.65	$18.40	$0.00	$68.16
	06/01/2025	$41.50	$9.65	$18.40	$0.00	$69.55
	12/01/2025	$42.88	$9.65	$18.40	$0.00	$70.93
	06/01/2026	$44.32	$9.65	$18.40	$0.00	$72.37
	12/01/2026	$45.76	$9.65	$18.40	$0.00	$73.81
	06/01/2027	$47.21	$9.65	$18.40	$0.00	$75.26
	12/01/2027	$48.66	$9.65	$18.40	$0.00	$76.71
	06/01/2028	$50.16	$9.65	$18.40	$0.00	$78.21
	12/01/2028	$51.66	$9.65	$18.40	$0.00	$79.71
For apprentice rates see "Apprentice- LABORER"						
OILER (OTHER THAN TRUCK CRANES,GRADALLS) *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$24.71	$15.30	$16.40	$0.00	$56.41
	12/01/2024	$25.37	$15.30	$16.40	$0.00	$57.07
	06/01/2025	$25.97	$15.30	$16.40	$0.00	$57.67
	12/01/2025	$26.63	$15.30	$16.40	$0.00	$58.33
	06/01/2026	$27.22	$15.30	$16.40	$0.00	$58.92
	12/01/2026	$27.89	$15.30	$16.40	$0.00	$59.59
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OILER (TRUCK CRANES, GRADALLS) *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$30.28	$15.30	$16.40	$0.00	$61.98
	12/01/2024	$31.08	$15.30	$16.40	$0.00	$62.78
	06/01/2025	$31.80	$15.30	$16.40	$0.00	$63.50
	12/01/2025	$32.60	$15.30	$16.40	$0.00	$64.30
	06/01/2026	$33.32	$15.30	$16.40	$0.00	$65.02
	12/01/2026	$34.12	$15.30	$16.40	$0.00	$65.82
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
OTHER POWER DRIVEN EQUIPMENT - CLASS II *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$55.41	$15.30	$16.40	$0.00	$87.11
	12/01/2024	$56.85	$15.30	$16.40	$0.00	$88.55
	06/01/2025	$58.13	$15.30	$16.40	$0.00	$89.83
	12/01/2025	$59.57	$15.30	$16.40	$0.00	$91.27
	06/01/2026	$60.85	$15.30	$16.40	$0.00	$92.55
	12/01/2026	$62.29	$15.30	$16.40	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) *PAINTERS LOCAL 35 - ZONE 2*	07/01/2024	$57.26	$9.95	$23.95	$0.00	$91.16
	01/01/2025	$58.46	$9.95	$23.95	$0.00	$92.36

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.63	$9.95	$0.00	$0.00	$38.58
2	55	$31.49	$9.95	$6.66	$0.00	$48.10
3	60	$34.36	$9.95	$7.26	$0.00	$51.57
4	65	$37.22	$9.95	$7.87	$0.00	$55.04
5	70	$40.08	$9.95	$20.32	$0.00	$70.35
6	75	$42.95	$9.95	$20.93	$0.00	$73.83
7	80	$45.81	$9.95	$21.53	$0.00	$77.29
8	90	$51.53	$9.95	$22.74	$0.00	$84.22

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$29.23	$9.95	$0.00	$0.00	$39.18
2	55	$32.15	$9.95	$6.66	$0.00	$48.76
3	60	$35.08	$9.95	$7.26	$0.00	$52.29
4	65	$38.00	$9.95	$7.87	$0.00	$55.82
5	70	$40.92	$9.95	$20.32	$0.00	$71.19
6	75	$43.85	$9.95	$20.93	$0.00	$74.73
7	80	$46.77	$9.95	$21.53	$0.00	$78.25
8	90	$52.61	$9.95	$22.74	$0.00	$85.30

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	07/01/2024	$48.16	$9.95	$23.95	$0.00	$82.06
	01/01/2025	$49.36	$9.95	$23.95	$0.00	$83.26

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - New*

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.08	$9.95	$0.00	$0.00	$34.03
2	55	$26.49	$9.95	$6.66	$0.00	$43.10
3	60	$28.90	$9.95	$7.26	$0.00	$46.11
4	65	$31.30	$9.95	$7.87	$0.00	$49.12
5	70	$33.71	$9.95	$20.32	$0.00	$63.98
6	75	$36.12	$9.95	$20.93	$0.00	$67.00
7	80	$38.53	$9.95	$21.53	$0.00	$70.01
8	90	$43.34	$9.95	$22.74	$0.00	$76.03

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.68	$9.95	$0.00	$0.00	$34.63
2	55	$27.15	$9.95	$6.66	$0.00	$43.76
3	60	$29.62	$9.95	$7.26	$0.00	$46.83
4	65	$32.08	$9.95	$7.87	$0.00	$49.90
5	70	$34.55	$9.95	$20.32	$0.00	$64.82
6	75	$37.02	$9.95	$20.93	$0.00	$67.90
7	80	$39.49	$9.95	$21.53	$0.00	$70.97
8	90	$44.42	$9.95	$22.74	$0.00	$77.11

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	07/01/2024	$46.22	$9.95	$23.95	$0.00	$80.12
	01/01/2025	$47.42	$9.95	$23.95	$0.00	$81.32

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - Repaint*

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.11	$9.95	$0.00	$0.00	$33.06
2	55	$25.42	$9.95	$6.66	$0.00	$42.03
3	60	$27.73	$9.95	$7.26	$0.00	$44.94
4	65	$30.04	$9.95	$7.87	$0.00	$47.86
5	70	$32.35	$9.95	$20.32	$0.00	$62.62
6	75	$34.67	$9.95	$20.93	$0.00	$65.55
7	80	$36.98	$9.95	$21.53	$0.00	$68.46
8	90	$41.60	$9.95	$22.74	$0.00	$74.29

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.71	$9.95	$0.00	$0.00	$33.66
2	55	$26.08	$9.95	$6.66	$0.00	$42.69
3	60	$28.45	$9.95	$7.26	$0.00	$45.66
4	65	$30.82	$9.95	$7.87	$0.00	$48.64
5	70	$33.19	$9.95	$20.32	$0.00	$63.46
6	75	$35.57	$9.95	$20.93	$0.00	$66.45
7	80	$37.94	$9.95	$21.53	$0.00	$69.42
8	90	$42.68	$9.95	$22.74	$0.00	$75.37

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, NEW) *	07/01/2024	$46.76	$9.95	$23.95	$0.00	$80.66
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	01/01/2025	$47.96	$9.95	$23.95	$0.00	$81.86

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER - Local 35 Zone 2 - BRUSH NEW*

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.38	$9.95	$0.00	$0.00	$33.33
2	55	$25.72	$9.95	$6.66	$0.00	$42.33
3	60	$28.06	$9.95	$7.26	$0.00	$45.27
4	65	$30.39	$9.95	$7.87	$0.00	$48.21
5	70	$32.73	$9.95	$20.32	$0.00	$63.00
6	75	$35.07	$9.95	$20.93	$0.00	$65.95
7	80	$37.41	$9.95	$21.53	$0.00	$68.89
8	90	$42.08	$9.95	$22.74	$0.00	$74.77

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.98	$9.95	$0.00	$0.00	$33.93
2	55	$26.38	$9.95	$6.66	$0.00	$42.99
3	60	$28.78	$9.95	$7.26	$0.00	$45.99
4	65	$31.17	$9.95	$7.87	$0.00	$48.99
5	70	$33.57	$9.95	$20.32	$0.00	$63.84
6	75	$35.97	$9.95	$20.93	$0.00	$66.85
7	80	$38.37	$9.95	$21.53	$0.00	$69.85
8	90	$43.16	$9.95	$22.74	$0.00	$75.85

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	07/01/2024	$44.82	$9.95	$23.95	$0.00	$78.72
	01/01/2025	$46.02	$9.95	$23.95	$0.00	$79.92

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 2 - BRUSH REPAINT*

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.41	$9.95	$0.00	$0.00	$32.36
2	55	$24.65	$9.95	$6.66	$0.00	$41.26
3	60	$26.89	$9.95	$7.26	$0.00	$44.10
4	65	$29.13	$9.95	$7.87	$0.00	$46.95
5	70	$31.37	$9.95	$20.32	$0.00	$61.64
6	75	$33.62	$9.95	$20.93	$0.00	$64.50
7	80	$35.86	$9.95	$21.53	$0.00	$67.34
8	90	$40.34	$9.95	$22.74	$0.00	$73.03

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.01	$9.95	$0.00	$0.00	$32.96
2	55	$25.31	$9.95	$6.66	$0.00	$41.92
3	60	$27.61	$9.95	$7.26	$0.00	$44.82
4	65	$29.91	$9.95	$7.87	$0.00	$47.73
5	70	$32.21	$9.95	$20.32	$0.00	$62.48
6	75	$34.52	$9.95	$20.93	$0.00	$65.40
7	80	$36.82	$9.95	$21.53	$0.00	$68.30
8	90	$41.42	$9.95	$22.74	$0.00	$74.11

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2024	$38.53	$9.65	$17.80	$0.00	$65.98
	12/01/2024	$39.86	$9.65	$17.80	$0.00	$67.31
	06/01/2025	$41.25	$9.65	$17.80	$0.00	$68.70
	12/01/2025	$42.63	$9.65	$17.80	$0.00	$70.08
	06/01/2026	$44.07	$9.65	$17.80	$0.00	$71.52
	12/01/2026	$45.51	$9.65	$17.80	$0.00	$72.96
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
PANEL & PICKUP TRUCKS DRIVER *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	06/01/2024	$39.78	$15.07	$18.67	$0.00	$73.52
	12/01/2024	$39.78	$15.07	$20.17	$0.00	$75.02
	01/01/2025	$39.78	$15.57	$20.17	$0.00	$75.52
	06/01/2025	$40.78	$15.57	$20.17	$0.00	$76.52
	12/01/2025	$40.78	$15.57	$21.78	$0.00	$78.13
	01/01/2026	$40.78	$16.17	$21.78	$0.00	$78.73
	06/01/2026	$41.78	$16.17	$21.78	$0.00	$79.73
	12/01/2026	$41.78	$16.17	$23.52	$0.00	$81.47
	01/01/2027	$41.78	$16.77	$23.52	$0.00	$82.07

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) *PILE DRIVER LOCAL 56 (ZONE 2)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2020	$46.11	$9.40	$23.12	$0.00	$78.63
PILE DRIVER *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$46.11	$9.40	$23.12	$0.00	$78.63

Apprentice - *PILE DRIVER - Local 56 Zone 2*

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	0	$0.00	$0.00	$0.00	$0.00	$0.00

Notes: Apprentice wages shall be no less than the following Steps;
(Same as set in Zone 1)
1$57.06/2$61.96/3$66.87/4$69.32/5$71.78/6$71.78/7$76.68/8$76.68

Apprentice to Journeyworker Ratio:1:5

PIPELAYER *LABORERS - ZONE 2*	06/01/2024	$38.78	$9.65	$18.40	$0.00	$66.83
	12/01/2024	$40.11	$9.65	$18.40	$0.00	$68.16
	06/01/2025	$41.50	$9.65	$18.40	$0.00	$69.55
	12/01/2025	$42.88	$9.65	$18.40	$0.00	$70.93
	06/01/2026	$44.32	$9.65	$18.40	$0.00	$72.37
	12/01/2026	$45.76	$9.65	$18.40	$0.00	$73.81
	06/01/2027	$47.21	$9.65	$18.40	$0.00	$75.26
	12/01/2027	$48.66	$9.65	$18.40	$0.00	$76.71
	06/01/2028	$50.16	$9.65	$18.40	$0.00	$78.21
	12/01/2028	$51.66	$9.65	$18.40	$0.00	$79.71
For apprentice rates see "Apprentice- LABORER"						
PIPELAYER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2024	$38.78	$9.65	$17.80	$0.00	$66.23
	12/01/2024	$40.11	$9.65	$17.80	$0.00	$67.56
	06/01/2025	$41.50	$9.65	$17.80	$0.00	$68.95
	12/01/2025	$42.88	$9.65	$17.80	$0.00	$70.33
	06/01/2026	$44.32	$9.65	$17.80	$0.00	$71.77
	12/01/2026	$45.76	$9.65	$17.80	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
PLUMBER & PIPEFITTER *PLUMBERS LOCAL 4*	09/01/2024	$55.35	$9.90	$17.42	$0.00	$82.67
	03/01/2025	$56.75	$9.90	$17.42	$0.00	$84.07
	09/01/2025	$58.15	$9.90	$17.42	$0.00	$85.47
	03/01/2026	$59.55	$9.90	$17.42	$0.00	$86.87

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PLUMBER/PIPEFITTER - Local 4*

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$22.14	$9.90	$0.00	$0.00	$32.04
2	50	$27.68	$9.90	$0.00	$0.00	$37.58
3	60	$33.21	$9.90	$0.00	$0.00	$43.11
4	70	$38.75	$9.90	$7.71	$0.00	$56.36
5	80	$44.28	$9.90	$7.71	$0.00	$61.89

Effective Date - 03/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$22.70	$9.90	$0.00	$0.00	$32.60
2	50	$28.38	$9.90	$0.00	$0.00	$38.28
3	60	$34.05	$9.90	$0.00	$0.00	$43.95
4	70	$39.73	$9.90	$7.71	$0.00	$57.34
5	80	$45.40	$9.90	$7.71	$0.00	$63.01

Notes:
Steps - 2000 hrs; Step 4 w/lic 75%, Step 5 w/lic 85%
Step 4 w/lic $52.59, Step 5 w/lic $57.44

Apprentice to Journeyworker Ratio:1:3

PNEUMATIC CONTROLS (TEMP.) *PLUMBERS LOCAL 4*	09/01/2024	$55.35	$9.90	$17.42	$0.00	$82.67
	03/01/2025	$56.75	$9.90	$17.42	$0.00	$84.07
	09/01/2025	$58.15	$9.90	$17.42	$0.00	$85.47
	03/01/2026	$59.55	$9.90	$17.42	$0.00	$86.87
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
PNEUMATIC DRILL/TOOL OPERATOR *LABORERS - ZONE 2*	06/01/2024	$39.28	$9.65	$18.40	$0.00	$67.33
	12/01/2024	$40.61	$9.65	$18.40	$0.00	$68.66
	06/01/2025	$42.00	$9.65	$18.40	$0.00	$70.05
	12/01/2025	$43.38	$9.65	$18.40	$0.00	$71.43
	06/01/2026	$44.82	$9.65	$18.40	$0.00	$72.87
	12/01/2026	$46.26	$9.65	$18.40	$0.00	$74.31
	06/01/2027	$47.71	$9.65	$18.40	$0.00	$75.76
	12/01/2027	$49.16	$9.65	$18.40	$0.00	$77.21
	06/01/2028	$50.66	$9.65	$18.40	$0.00	$78.71
	12/01/2028	$52.16	$9.65	$18.40	$0.00	$80.21
For apprentice rates see "Apprentice- LABORER"						
PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2024	$38.78	$9.65	$17.80	$0.00	$66.23
	12/01/2024	$40.11	$9.65	$17.80	$0.00	$67.56
	06/01/2025	$41.50	$9.65	$17.80	$0.00	$68.95
	12/01/2025	$42.88	$9.65	$17.80	$0.00	$70.33
	06/01/2026	$44.32	$9.65	$17.80	$0.00	$71.77
	12/01/2026	$45.76	$9.65	$17.80	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
POWDERMAN & BLASTER *LABORERS - ZONE 2*	06/01/2024	$39.53	$9.65	$18.40	$0.00	$67.58
	12/01/2024	$40.86	$9.65	$18.40	$0.00	$68.91
	06/01/2025	$42.25	$9.65	$18.40	$0.00	$70.30
	12/01/2025	$43.63	$9.65	$18.40	$0.00	$71.68
	06/01/2026	$45.07	$9.65	$18.40	$0.00	$73.12
	12/01/2026	$46.51	$9.65	$18.40	$0.00	$74.56
	06/01/2027	$47.96	$9.65	$18.40	$0.00	$76.01
	12/01/2027	$49.41	$9.65	$18.40	$0.00	$77.46
	06/01/2028	$50.91	$9.65	$18.40	$0.00	$78.96
	12/01/2028	$52.41	$9.65	$18.40	$0.00	$80.46
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2024	$39.53	$9.40	$17.55	$0.00	$66.48
	12/01/2024	$40.86	$9.40	$17.55	$0.00	$67.81
	06/01/2025	$42.25	$9.40	$17.55	$0.00	$69.20
	12/01/2025	$43.63	$9.40	$17.55	$0.00	$70.58
	06/01/2026	$45.07	$9.40	$17.55	$0.00	$72.02
	12/01/2026	$46.51	$9.40	$17.55	$0.00	$73.46
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
POWER SHOVEL/DERRICK/TRENCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$56.03	$15.30	$16.40	$0.00	$87.73
	12/01/2024	$57.48	$15.30	$16.40	$0.00	$89.18
	06/01/2025	$58.78	$15.30	$16.40	$0.00	$90.48
	12/01/2025	$60.23	$15.30	$16.40	$0.00	$91.93
	06/01/2026	$61.53	$15.30	$16.40	$0.00	$93.23
	12/01/2026	$62.98	$15.30	$16.40	$0.00	$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$55.41	$15.30	$16.40	$0.00	$87.11
	12/01/2024	$56.85	$15.30	$16.40	$0.00	$88.55
	06/01/2025	$58.13	$15.30	$16.40	$0.00	$89.83
	12/01/2025	$59.57	$15.30	$16.40	$0.00	$91.27
	06/01/2026	$60.85	$15.30	$16.40	$0.00	$92.55
	12/01/2026	$62.29	$15.30	$16.40	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$36.17	$15.30	$16.40	$0.00	$67.87
	12/01/2024	$37.12	$15.30	$16.40	$0.00	$68.82
	06/01/2025	$37.97	$15.30	$16.40	$0.00	$69.67
	12/01/2025	$38.92	$15.30	$16.40	$0.00	$70.62
	06/01/2026	$39.78	$15.30	$16.40	$0.00	$71.48
	12/01/2026	$40.73	$15.30	$16.40	$0.00	$72.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER *TEAMSTERS 170 - Dauphinais (Bellingham)*	01/01/2024	$27.00	$10.76	$5.45	$0.00	$43.21
	12/01/2024	$27.60	$11.26	$6.15	$0.00	$45.01
	01/01/2025	$27.60	$11.26	$6.15	$0.00	$45.01

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
RECLAIMERS *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$55.41	$15.30	$16.40	$0.00	$87.11
	12/01/2024	$56.85	$15.30	$16.40	$0.00	$88.55
	06/01/2025	$58.13	$15.30	$16.40	$0.00	$89.83
	12/01/2025	$59.57	$15.30	$16.40	$0.00	$91.27
	06/01/2026	$60.85	$15.30	$16.40	$0.00	$92.55
	12/01/2026	$62.29	$15.30	$16.40	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RIDE-ON MOTORIZED BUGGY OPERATOR *LABORERS - ZONE 2*	06/01/2024	$38.78	$9.65	$18.40	$0.00	$66.83
	12/01/2024	$40.11	$9.65	$18.40	$0.00	$68.16
	06/01/2025	$41.50	$9.65	$18.40	$0.00	$69.55
	12/01/2025	$42.88	$9.65	$18.40	$0.00	$70.93
	06/01/2026	$44.32	$9.65	$18.40	$0.00	$72.37
	12/01/2026	$45.76	$9.65	$18.40	$0.00	$73.81
	06/01/2027	$47.21	$9.65	$18.40	$0.00	$75.26
	12/01/2027	$48.66	$9.65	$18.40	$0.00	$76.71
	06/01/2028	$50.16	$9.65	$18.40	$0.00	$78.21
	12/01/2028	$51.66	$9.65	$18.40	$0.00	$79.71
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$55.41	$15.30	$16.40	$0.00	$87.11
	12/01/2024	$56.85	$15.30	$16.40	$0.00	$88.55
	06/01/2025	$58.13	$15.30	$16.40	$0.00	$89.83
	12/01/2025	$59.57	$15.30	$16.40	$0.00	$91.27
	06/01/2026	$60.85	$15.30	$16.40	$0.00	$92.55
	12/01/2026	$62.29	$15.30	$16.40	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg) *ROOFERS LOCAL 33*	08/01/2024	$51.53	$12.78	$21.45	$0.00	$85.76
	02/01/2025	$52.78	$12.78	$21.45	$0.00	$87.01
	08/01/2025	$54.28	$12.78	$21.45	$0.00	$88.51
	02/01/2026	$55.53	$12.78	$21.45	$0.00	$89.76

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ROOFER - Local 33*

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.77	$12.78	$6.21	$0.00	$44.76
2	60	$30.92	$12.78	$21.45	$0.00	$65.15
3	65	$33.49	$12.78	$21.45	$0.00	$67.72
4	75	$38.65	$12.78	$21.45	$0.00	$72.88
5	85	$43.80	$12.78	$21.45	$0.00	$78.03

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.39	$12.78	$6.21	$0.00	$45.38
2	60	$31.67	$12.78	$21.45	$0.00	$65.90
3	65	$34.31	$12.78	$21.45	$0.00	$68.54
4	75	$39.59	$12.78	$21.45	$0.00	$73.82
5	85	$44.86	$12.78	$21.45	$0.00	$79.09

Notes: ** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1
Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs.
(Hot Pitch Mechanics' receive $1.00 hr. above ROOFER)

Apprentice to Journeyworker Ratio:**

ROOFER SLATE / TILE / PRECAST CONCRETE *ROOFERS LOCAL 33*	08/01/2024	$51.78	$12.78	$21.45	$0.00	$86.01
	02/01/2025	$53.03	$12.78	$21.45	$0.00	$87.26
	08/01/2025	$54.53	$12.78	$21.45	$0.00	$88.76
	02/01/2026	$55.78	$12.78	$21.45	$0.00	$90.01
For apprentice rates see "Apprentice- ROOFER"						
SHEETMETAL WORKER *SHEETMETAL WORKERS LOCAL 63*	07/01/2024	$40.98	$12.20	$18.74	$2.13	$74.05
	01/01/2025	$42.23	$12.20	$18.74	$2.13	$75.30

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *SHEET METAL WORKER - Local 63*

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$18.44	$5.49	$4.86	$0.85	$29.64
2	50	$20.49	$6.10	$5.40	$0.94	$32.93
3	55	$22.54	$6.71	$9.71	$1.15	$40.11
4	60	$24.59	$7.32	$9.71	$1.23	$42.85
5	65	$26.64	$7.93	$9.71	$1.31	$45.59
6	70	$28.69	$8.54	$9.71	$1.39	$48.33
7	75	$30.74	$9.15	$9.71	$1.47	$51.07
8	80	$32.78	$9.76	$17.66	$1.78	$61.98
9	85	$34.83	$10.37	$17.66	$1.86	$64.72
10	90	$36.88	$10.98	$17.66	$1.94	$67.46

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$19.00	$5.49	$4.86	$0.85	$30.20
2	50	$21.12	$6.10	$5.40	$0.94	$33.56
3	55	$23.23	$6.71	$9.71	$1.15	$40.80
4	60	$25.34	$7.32	$9.71	$1.23	$43.60
5	65	$27.45	$7.93	$9.71	$1.31	$46.40
6	70	$29.56	$8.54	$9.71	$1.39	$49.20
7	75	$31.67	$9.15	$9.71	$1.47	$52.00
8	80	$33.78	$9.76	$17.66	$1.78	$62.98
9	85	$35.90	$10.37	$17.66	$1.86	$65.79
10	90	$38.01	$10.98	$17.66	$1.94	$68.59

Notes:

Apprentice to Journeyworker Ratio:1:3

SPECIALIZED EARTH MOVING EQUIP < 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	06/01/2024	$40.24	$15.07	$18.67	$0.00	$73.98
	12/01/2024	$40.24	$15.07	$20.17	$0.00	$75.48
	01/01/2025	$40.24	$15.57	$20.17	$0.00	$75.98
	06/01/2025	$41.24	$15.57	$20.17	$0.00	$76.98
	12/01/2025	$41.24	$15.57	$21.78	$0.00	$78.59
	01/01/2026	$41.24	$16.17	$21.78	$0.00	$79.19
	06/01/2026	$42.24	$16.17	$21.78	$0.00	$80.19
	12/01/2026	$42.24	$16.17	$23.52	$0.00	$81.93
	01/01/2027	$42.24	$16.77	$23.52	$0.00	$82.53

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SPECIALIZED EARTH MOVING EQUIP > 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	06/01/2024	$40.53	$15.07	$18.67	$0.00	$74.27
	12/01/2024	$40.53	$15.07	$20.17	$0.00	$75.77
	01/01/2025	$40.53	$15.57	$20.17	$0.00	$76.27
	06/01/2025	$41.53	$15.57	$20.17	$0.00	$77.27
	12/01/2025	$41.53	$15.57	$21.78	$0.00	$78.88
	01/01/2026	$41.53	$16.17	$21.78	$0.00	$79.48
	06/01/2026	$42.53	$16.17	$21.78	$0.00	$80.48
	12/01/2026	$42.53	$16.17	$23.52	$0.00	$82.22
	01/01/2027	$42.53	$16.77	$23.52	$0.00	$82.82
SPRINKLER FITTER *SPRINKLER FITTERS LOCAL 669*	04/01/2023	$47.43	$11.45	$16.61	$0.00	$75.49

Apprentice - *SPRINKLER FITTER - Local 669*

Effective Date - 04/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$21.34	$8.22	$0.00	$0.00	$29.56
2	50	$23.72	$8.22	$0.00	$0.00	$31.94
3	55	$26.09	$11.45	$7.20	$0.00	$44.74
4	60	$28.46	$11.45	$8.35	$0.00	$48.26
5	65	$30.83	$11.45	$8.35	$0.00	$50.63
6	70	$33.20	$11.45	$8.60	$0.00	$53.25
7	75	$35.57	$11.45	$8.60	$0.00	$55.62
8	80	$37.94	$11.45	$8.60	$0.00	$57.99
9	85	$40.32	$11.45	$8.60	$0.00	$60.37
10	90	$42.69	$11.45	$8.60	$0.00	$62.74

Notes:

Apprentice to Journeyworker Ratio:1:1

STEAM BOILER OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$55.41	$15.30	$16.40	$0.00	$87.11
	12/01/2024	$56.85	$15.30	$16.40	$0.00	$88.55
	06/01/2025	$58.13	$15.30	$16.40	$0.00	$89.83
	12/01/2025	$59.57	$15.30	$16.40	$0.00	$91.27
	06/01/2026	$60.85	$15.30	$16.40	$0.00	$92.55
	12/01/2026	$62.29	$15.30	$16.40	$0.00	$93.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$55.41	$15.30	$16.40	$0.00	$87.11
	12/01/2024	$56.85	$15.30	$16.40	$0.00	$88.55
	06/01/2025	$58.13	$15.30	$16.40	$0.00	$89.83
	12/01/2025	$59.57	$15.30	$16.40	$0.00	$91.27
	06/01/2026	$60.85	$15.30	$16.40	$0.00	$92.55
	12/01/2026	$62.29	$15.30	$16.40	$0.00	$93.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TERRAZZO FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	08/01/2024	$63.44	$11.49	$23.59	$0.00	$98.52
	02/01/2025	$64.74	$11.49	$23.59	$0.00	$99.82
	08/01/2025	$66.89	$11.49	$23.59	$0.00	$101.97
	02/01/2026	$68.24	$11.49	$23.59	$0.00	$103.32
	08/01/2026	$70.44	$11.49	$23.59	$0.00	$105.52
	02/01/2027	$71.84	$11.49	$23.59	$0.00	$106.92

Apprentice - *TERRAZZO FINISHER - Local 3 Marble & Tile*

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$31.72	$11.49	$23.59	$0.00	$66.80
2	60	$38.06	$11.49	$23.59	$0.00	$73.14
3	70	$44.41	$11.49	$23.59	$0.00	$79.49
4	80	$50.75	$11.49	$23.59	$0.00	$85.83
5	90	$57.10	$11.49	$23.59	$0.00	$92.18

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$32.37	$11.49	$23.59	$0.00	$67.45
2	60	$38.84	$11.49	$23.59	$0.00	$73.92
3	70	$45.32	$11.49	$23.59	$0.00	$80.40
4	80	$51.79	$11.49	$23.59	$0.00	$86.87
5	90	$58.27	$11.49	$23.59	$0.00	$93.35

Notes:

Apprentice to Journeyworker Ratio:1:3

TEST BORING DRILLER *LABORERS - FOUNDATION AND MARINE*	06/01/2024	$49.81	$9.65	$18.22	$0.00	$77.68
	12/01/2024	$51.28	$9.65	$18.22	$0.00	$79.15
	06/01/2025	$52.78	$9.65	$18.22	$0.00	$80.65
	12/01/2025	$54.28	$9.65	$18.22	$0.00	$82.15
	06/01/2026	$55.83	$9.65	$18.22	$0.00	$83.70
	12/01/2026	$57.33	$9.65	$18.22	$0.00	$85.20

For apprentice rates see "Apprentice- LABORER"

TEST BORING DRILLER HELPER *LABORERS - FOUNDATION AND MARINE*	06/01/2024	$45.60	$9.65	$18.22	$0.00	$73.47
	12/01/2024	$47.07	$9.65	$18.22	$0.00	$74.94
	06/01/2025	$48.57	$9.65	$18.22	$0.00	$76.44
	12/01/2025	$50.07	$9.65	$18.22	$0.00	$77.94
	06/01/2026	$51.62	$9.65	$18.22	$0.00	$79.49
	12/01/2026	$53.12	$9.65	$18.22	$0.00	$80.99

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TEST BORING LABORER *LABORERS - FOUNDATION AND MARINE*	06/01/2024	$45.48	$9.65	$18.22	$0.00	$73.35
	12/01/2024	$46.95	$9.65	$18.22	$0.00	$74.82
	06/01/2025	$48.45	$9.65	$18.22	$0.00	$76.32
	12/01/2025	$49.95	$9.65	$18.22	$0.00	$77.82
	06/01/2026	$51.50	$9.65	$18.22	$0.00	$79.37
	12/01/2026	$53.00	$9.65	$18.22	$0.00	$80.87
For apprentice rates see "Apprentice- LABORER"						
TRACTORS/PORTABLE STEAM GENERATORS *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$55.41	$15.30	$16.40	$0.00	$87.11
	12/01/2024	$56.85	$15.30	$16.40	$0.00	$88.55
	06/01/2025	$58.13	$15.30	$16.40	$0.00	$89.83
	12/01/2025	$59.57	$15.30	$16.40	$0.00	$91.27
	06/01/2026	$60.85	$15.30	$16.40	$0.00	$92.55
	12/01/2026	$62.29	$15.30	$16.40	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TRAILERS FOR EARTH MOVING EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	06/01/2024	$40.82	$15.07	$18.67	$0.00	$74.56
	12/01/2024	$40.82	$15.07	$20.17	$0.00	$76.06
	01/01/2025	$40.82	$15.57	$20.17	$0.00	$76.56
	06/01/2025	$41.82	$15.57	$20.17	$0.00	$77.56
	12/01/2025	$41.82	$15.57	$21.78	$0.00	$79.17
	01/01/2026	$41.82	$16.17	$21.78	$0.00	$79.77
	06/01/2026	$42.82	$16.17	$21.78	$0.00	$80.77
	12/01/2026	$42.82	$16.17	$23.52	$0.00	$82.51
	01/01/2027	$42.82	$16.77	$23.52	$0.00	$83.11
TUNNEL WORK - COMPRESSED AIR *LABORERS (COMPRESSED AIR)*	06/01/2024	$57.71	$9.65	$19.00	$0.00	$86.36
	12/01/2024	$59.18	$9.65	$19.00	$0.00	$87.83
	06/01/2025	$60.68	$9.65	$19.00	$0.00	$89.33
	12/01/2025	$62.18	$9.65	$19.00	$0.00	$90.83
	06/01/2026	$63.73	$9.65	$19.00	$0.00	$92.38
	12/01/2026	$65.23	$9.65	$19.00	$0.00	$93.88
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) *LABORERS (COMPRESSED AIR)*	06/01/2024	$59.71	$9.65	$19.00	$0.00	$88.36
	12/01/2024	$61.18	$9.65	$19.00	$0.00	$89.83
	06/01/2025	$62.68	$9.65	$19.00	$0.00	$91.33
	12/01/2025	$64.18	$9.65	$19.00	$0.00	$92.83
	06/01/2026	$65.73	$9.65	$19.00	$0.00	$94.38
	12/01/2026	$67.23	$9.65	$19.00	$0.00	$95.88
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR *LABORERS (FREE AIR TUNNEL)*	06/01/2024	$49.78	$9.65	$19.00	$0.00	$78.43
	12/01/2024	$51.25	$9.65	$19.00	$0.00	$79.90
	06/01/2025	$52.75	$9.65	$19.00	$0.00	$81.40
	12/01/2025	$54.25	$9.65	$19.00	$0.00	$82.90
	06/01/2026	$55.80	$9.65	$19.00	$0.00	$84.45
	12/01/2026	$57.30	$9.65	$19.00	$0.00	$85.95
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TUNNEL WORK - FREE AIR (HAZ. WASTE) *LABORERS (FREE AIR TUNNEL)*	06/01/2024	$51.78	$9.65	$19.00	$0.00	$80.43
	12/01/2024	$53.25	$9.65	$19.00	$0.00	$81.90
	06/01/2025	$54.75	$9.65	$19.00	$0.00	$83.40
	12/01/2025	$56.25	$9.65	$19.00	$0.00	$84.90
	06/01/2026	$57.80	$9.65	$19.00	$0.00	$86.45
	12/01/2026	$59.30	$9.65	$19.00	$0.00	$87.95
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	06/01/2024	$40.24	$15.07	$18.67	$0.00	$73.98
	12/01/2024	$40.24	$15.07	$20.17	$0.00	$75.48
	01/01/2025	$40.24	$15.57	$20.17	$0.00	$75.98
	06/01/2025	$41.24	$15.57	$20.17	$0.00	$76.98
	12/01/2025	$41.24	$15.57	$21.78	$0.00	$78.59
	01/01/2026	$41.24	$16.17	$21.78	$0.00	$79.19
	06/01/2026	$42.24	$16.17	$21.78	$0.00	$80.19
	12/01/2026	$42.24	$16.17	$23.52	$0.00	$81.93
	01/01/2027	$42.24	$16.77	$23.52	$0.00	$82.53
VOICE-DATA-VIDEO TECHNICIAN *ELECTRICIANS LOCAL 96*	09/01/2024	$35.29	$13.99	$17.57	$0.00	$66.85
	09/07/2025	$36.12	$14.98	$17.91	$0.00	$69.01
	09/06/2026	$37.04	$15.96	$18.27	$0.00	$71.27

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *VOICE-DATA-VIDEO TECHNICIAN - Local 96*

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$17.65	$13.99	$4.41	$0.00	$36.05
2	55	$19.41	$13.99	$4.46	$0.00	$37.86
3	60	$21.17	$13.99	$17.15	$0.00	$52.31
4	65	$22.94	$13.99	$17.20	$0.00	$54.13
5	70	$24.70	$13.99	$17.25	$0.00	$55.94
6	75	$26.47	$13.99	$17.30	$0.00	$57.76
7	80	$28.23	$13.99	$17.36	$0.00	$59.58
8	85	$30.00	$13.99	$17.41	$0.00	$61.40

Effective Date - 09/07/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$18.06	$14.98	$4.51	$0.00	$37.55
2	55	$19.87	$14.98	$4.57	$0.00	$39.42
3	60	$21.67	$14.98	$17.48	$0.00	$54.13
4	65	$23.48	$14.98	$17.53	$0.00	$55.99
5	70	$25.28	$14.98	$17.59	$0.00	$57.85
6	75	$27.09	$14.98	$17.64	$0.00	$59.71
7	80	$28.90	$14.98	$17.70	$0.00	$61.58
8	85	$30.70	$14.98	$17.75	$0.00	$63.43

Notes:

Apprentice to Journeyworker Ratio:1:1

WAGON DRILL OPERATOR *LABORERS - ZONE 2*	06/01/2024	$39.28	$9.65	$18.40	$0.00	$67.33
	12/01/2024	$40.61	$9.65	$18.40	$0.00	$68.66
	06/01/2025	$42.00	$9.65	$18.40	$0.00	$70.05
	12/01/2025	$43.38	$9.65	$18.40	$0.00	$71.43
	06/01/2026	$44.82	$9.65	$18.40	$0.00	$72.87
	12/01/2026	$46.26	$9.65	$18.40	$0.00	$74.31
	06/01/2027	$47.71	$9.65	$18.40	$0.00	$75.76
	12/01/2027	$49.16	$9.65	$18.40	$0.00	$77.21
	06/01/2028	$50.66	$9.65	$18.40	$0.00	$78.71
	12/01/2028	$52.16	$9.65	$18.40	$0.00	$80.21

For apprentice rates see "Apprentice- LABORER"

WAGON DRILL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2024	$38.78	$9.65	$17.80	$0.00	$66.23
	12/01/2024	$40.11	$9.65	$17.80	$0.00	$67.56
	06/01/2025	$41.50	$9.65	$17.80	$0.00	$68.95
	12/01/2025	$42.88	$9.65	$17.80	$0.00	$70.33
	06/01/2026	$44.32	$9.65	$17.80	$0.00	$71.77
	12/01/2026	$45.76	$9.65	$17.80	$0.00	$73.21

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
WASTE WATER PUMP OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2024	$56.03	$15.30	$16.40	$0.00	$87.73
	12/01/2024	$57.48	$15.30	$16.40	$0.00	$89.18
	06/01/2025	$58.78	$15.30	$16.40	$0.00	$90.48
	12/01/2025	$60.23	$15.30	$16.40	$0.00	$91.93
	06/01/2026	$61.53	$15.30	$16.40	$0.00	$93.23
	12/01/2026	$62.98	$15.30	$16.40	$0.00	$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
WATER METER INSTALLER *PLUMBERS LOCAL 4*	09/01/2024	$55.35	$9.90	$17.42	$0.00	$82.67
	03/01/2025	$56.75	$9.90	$17.42	$0.00	$84.07
	09/01/2025	$58.15	$9.90	$17.42	$0.00	$85.47
	03/01/2026	$59.55	$9.90	$17.42	$0.00	$86.87
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						

Additional Apprentice Information:

Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the pre-determined hourly wage rate established by the Commissioner under the provisions of the M.G.L. c. 149, ss. 26-27D. Apprentice ratios are established by the Division of Apprenticeship Training pursuant to M.G.L. c. 23, ss. 11E-11L.

All apprentices must be registered with the Division of Apprenticeship Training in accordance with M.G.L. c. 23, ss. 11E-11L.

All steps are six months (1000 hours.)
Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

** Multiple ratios are listed in the comment field.
*** APP to JM; 1:1, 2:2, 2:3, 3:4, 4:4, 4:5, 4:6, 5:7, 6:7, 6:8, 6:9, 7:10, 8:10, 8:11, 8:12, 9:13, 10:13, 10:14, etc.
**** APP to JM; 1:1, 1:2, 2:3, 2:4, 3:5, 4:6, 4:7, 5:8, 6:9, 6:10, 7:11, 8:12, 8:13, 9:14, 10:15, 10:16, etc.

"General Decision Number: MA20240013 08/23/2024

Superseded General Decision Number: MA20230013

State: Massachusetts

Construction Type: Building

County: Worcester County in Massachusetts.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least $17.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2024.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least $12.90 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2024.

The applicable Executive Order minimum wage rate will be

adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at https://url.us.m.mimecastprotect.com/s/K1DWCjR6LmTGP0Et2T4Cm1Vmg?domain=dol.gov.

Modification Number	Publication Date
0	01/05/2024
1	01/19/2024
2	03/01/2024
3	03/22/2024
4	05/31/2024
5	06/14/2024
6	07/05/2024
7	08/23/2024

ASBE0006-013 09/01/2023

	Rates	Fringes
ASBESTOS WORKER/HEAT & FROST INSULATOR (Duct, Pipe, & Mechanical System Insulation)	$ 48.15	35.16

BRMA0003-004 08/01/2023

	Rates	Fringes
TILE FINISHER	$ 47.89	32.43
TILE SETTER	$ 62.42	34.37

BRMA0003-005 08/01/2023

	Rates	Fringes
BRICKLAYER (Includes Pointing, Caulking, Cleaning, and Waterproofing)	$ 60.26	33.71

CARP0336-001 03/01/2024

	Rates	Fringes
CARPENTER (Includes Acoustical Ceiling		

installation, Batt
Insulation, Drywall Hanging,
Form Work, Metal
Building-Metal Siding/Wall
Panels, Metal Stud
Installation, Scaffold
Building, Fireproofer, Window
and Curtain Wall Installation)...$ 46.86 30.94

ELEC0096-003 09/03/2023

	Rates	Fringes
ELECTRICIAN		
Includes HVAC/Temperature Controls Installation	$ 45.59	30.92
Low Voltage Wiring	$ 34.49	31.44

ELEV0041-005 01/01/2024

	Rates	Fringes
ELEVATOR MECHANIC	$ 63.71	37.885+a+b

FOOTNOTE:
a.Vacation: 6%/under 5 years based on regular hourly rate for all hours worked. 8%/over 5 years based on regular hourly rate for all hours worked.
b. PAID HOLIDAYS: New Year's Day; Memorial Day; Independence Day; Labor Day; Veterans' Day; Thanksgiving Day; the Friday after Thanksgiving Day; and Christmas Day.

ENGI0004-012 06/01/2024

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
GROUP 1: Backhoe/Excavator/Trackhoe, Loader	$ 56.03	32.75
GROUP 2: Bulldozer	$ 55.41	32.75

FOOTNOTE:
A. Paid Holidays: New Year's Day, Washington's Birthday, Memorial Day, Independence Day, Patriot's Day, Columbus Day, Labor Day, Vetersns Day; Thanksgiving Day and Christmas Day.

IRON0007-018 03/16/2024

	Rates	Fringes
IRONWORKER (Ornamental, Reinforcing, and Structural).....	$ 54.38	36.48

LABR0721-002 06/01/2018

	Rates	Fringes
LABORER (Mason Tender-Brick).....	$ 33.50	22.92

PAIN0035-018 01/01/2024

	Rates	Fringes
PAINTER (Brush/Roller, Including Drywall Finisher/Taper).....	$ 45.56	35.60

PLUM0004-004 03/01/2024

	Rates	Fringes
PLUMBER/PIPEFITTER (Includes HVAC Pipe and Unit Installation).....	$ 53.95	28.42

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* ROOF0033-005 08/01/2024

	Rates	Fringes
ROOFER.....	$ 51.03	35.38

SHEE0063-006 07/01/2024

	Rates	Fringes
SHEET METAL WORKER (Includes HVAC Duct and Unit Installation).....	$ 40.98	34.59

SUMA2014-002 04/04/2016

	Rates	Fringes
LABORER: Common or General.....	$ 39.84	12.04

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://url.us.m.mimecastprotect.com/s/nkx1CkRXDnTX1vlcrUOCG-x7u?domain=dol.gov.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this

classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

State Adopted Rate Identifiers

Classifications listed under the ""SA"" identifier indicate that the prevailing wage rate set by a state (or local) government was adopted under 29 C.F.R ?1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 01/03/2024 reflects the date on which the classifications and rates under the ?SA? identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor

200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

No General Bidder or Filed Sub-bidder will be eligible for a contract award unless the following certification has been completed and submitted to the Awarding Authority with its bid.

CITY OF WORCESTER
FORM OF
TAX PAYMENT CERTIFICATE

STATE LAW NOW MANDATES THAT TO DO BUSINESS WITH THE CITY OF WORCESTER the Massachusetts Revenue Enforcement and Protection Program of 1983 requires that the following be supplied with your Bid:

Date: _____

Pursuant to M.G.L. Chapter 62C, Section 49A, I certify under the Penalties of Perjury That I, To My Best Knowledge and Belief, Have Filed ALL Massachusetts State Tax Returns and Paid ALL Massachusetts State and City Taxes Required under Law.

Company Name: _____

Street and Number: _____

City or Town: _____

State: _____ Zip Code: _____

Telephone Number: _____

Social Security Number or Federal Identification Number: _____

Is Company Certified by State Office of Minority and Women Business Assistance (SOMWBA)?

Yes _____ Date of Certification: _____

No _____

Failure to complete this form may result in rejection of Bid and/or removal from City Bid Lists.

_____
BIDDER'S Authorized Signature

END OF SECTION

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IMPORTANT NOTICE TO BIDDERS

** **RESPONSIBLE EMPLOYER ORDINANCE**

and

MINORITY/WOMEN BUSINESS ENTERPRISE AND WORKER UTILIZATION

BIDDERS MUST COMPLETE FORMS EOO-101 AND REO-101, WHICH ARE PART OF THE BID SUBMISSION

GENERAL BIDDERS, PROPOSERS, TRADE CONTRACTORS, FILED SUBCONTRACTORS, AND NON-FILED SUBCONTRACTORS, AT EVERY TIER, MUST PROVIDE EVIDENCE OF COMPLIANCE WITH THE CITY OF WORCESTER'S RESPONSIBLE EMPLOYER ORDINANCE ("REO") (See, Supplementary General Conditions, Section 4.7).

PLEASE SEE THE FOLLOWING PAGES FOR FURTHER REO REQUIREMENTS.

Direct any questions about these forms and procedures to:

Contract Compliance Officer
City Hall – Room 201
455 Main Street
Worcester, MA 01608
(508) 799-1174
purchasing@worcesterma.gov

** This requirement applies to general bids over $100,000 and all subcontractors at every tier exclusive of any pricing threshold.

MINORITY/WOMEN BUSINESS ENTERPRISE AND WORKER UTILIZATION BIDDERS INFORMATION ON PROCEDURES AND FORMS

FORM E00-D/102

To make all contractors aware of their obligation to follow certain procedures and file appropriate reports pertaining to those procedures, the following sets for the City's the Minority/Women Business Enterprise and Worker Utilization requirements and the Responsible Employer Ordinance. Also included is the Affidavit of Acknowledgement and Certification of Compliance, Form E00-101. This form is to be completed and filed as part of your bid.

The following documents are included in this bid:

1. **AFFIDAVIT OF ACKNOWLEDGEMENT AND CERTIFICATION OF COMPLIANCE, E00-101**

General Contractors, Trade Contractors, Filed Subcontractors and Non-Filed Subcontractorsshall complete and submit this form as part of their bid on all City construction projects. Each additional subcontractor shall complete this form and submit it to the general contractor who shall forward it to the Contract Compliance Office, **PRIOR** to the subcontractor's beginning work on the project.

2. SUPPLEMENTAL EQUAL EMPLOYMENT OPPORTUNITY ANTI-DISCRIMINATION AND AFFIRMATIVE ACTION PROGRAM E00-D/3

The Supplemental Equal Employment Opportunity Anti-Discrimination and Affirmative Action requirements establish the goals and procedures for the utilization of minority and women owned businesses and people of color and women workers on City construction projects.

3. SUCCESSFUL BIDDER'S OBLIGATION TO PROCEDURES AND FORMS, E00-D/103
At page __, the list of procedures and forms that will be provided to the successful bidder for use prior to beginning work and at various times throughout the life of the project.

4. **AFFIDAVIT OF ACKNOWLEDGEMENT AND CERTIFICATION OF COMPLIANCE, E00-101**

General Contractors, Trade Contractors, Filed Subcontractors and Non-Filed Subcontractors complete and submit this form as part of their bid on all City construction projects. Each additional subcontractor shall complete this form and submit it to the general contractor who shall forward it to the Contract Compliance Office, **PRIOR** to the subcontractor's beginning work on the project.

5. SUPPLEMENTAL EQUAL EMPLOYMENT OPPORTUNITY ANTI-DISCRIMINATION AND AFFIRMATIVE ACTION PROGRAM E00-D/3

The agreement between the City of Worcester and the Massachusetts Commission Against Discrimination establishing the goals and procedures for the utilization of minority and women owned businesses and minority and women workers on City Construction projects.

6. SUCCESSFUL BIDDER'S OBLIGATION TO PROCEDURES AND FORMS, E00-D/103

This is a listing of the procedures and forms that will be provided to the successful bidder for use prior to beginning work and at various times throughout the life of the project.

CITY OF WORCESTER
MINORITY/WOMEN BUSINESS ENTERPRISE AND WORKER UTILIZATION PROGRAM
AFFIDAVIT OF ACKNOWLEDGEMENT and CERTIFICATE OF COMPLIANCE
FORM EOO-101

TO ALL CONTRACTORS:
The Bidder or Proposer and all Trade Contractors and Subcontractors under the Bidder or Proposer must complete and submit this form as part of their bid.

I. THE MINORITY AND WOMEN BUSINESS AND UTILIZATION PROGRAMS

During the performance of any contract with the City, all General Contractors, Trade Contractors, Filed Subcontractors, and Subcontractors are bound by the obligations of the Supplemental Equal Employment Opportunity Anti-Discrimination and Affirmative Action Program. All contractors and subcontractors (if subcontracting any portion of the work) are obligated to make a good faith effort to engage 10% minority and 15% women owned businesses. Further, each contractor shall make a good faith effort to maintain a workforce that is 38% minority and 10% women.

The undersigned hereby certifies that he/she is familiar with the provisions of the Supplemental Equal Employment Opportunity Anti-Discrimination and Affirmative Action Programs and agrees to adhere to the provisions therein.

II. This contractor IS ☐ or IS NOT ☐ certified by the Supplier Diversity Office of the Commonwealth of Massachusetts to be a minority or women owned and operated business; and

III. WILL ☐ or WILL NOT ☐ subcontract any portion of this contract.

Project Name: _____ Bid Number:_____

Authorized Signature: _____ Business Name:_____

Printed Name: _____ Title: _____

Address: _____ Date: _____

FORM EOO-D/3

THE CITY OF WORCESTER

SUPPLEMENTAL EQUAL EMPLOYMENT OPPORTUNITY ANTI-DISCRIMINATION AND AFFIRMATIVE ACTION PROGRAM

I. AGREEMENT

During the performance of this contract, the contractor or subcontractor (herein collectively referred to in this Form E00-D/3 as the "Contractor"), for himself/herself, his/her assignees, and successors in interest, agree as follows:

1. In conjunction with the performance of work under this contract, the Contractor shall not discriminate against any employee or applicant for employment because of race, color, religious creed, national origin, age, sex, or handicap. The aforesaid provision shall include, but not be limited to, the following: employment upgrading, demotion, or transfer; recruitment advertising; layoff; termination, rates of pay or other forms of compensation; conditions or privileges of employment; and selection for apprenticeship. The Contractor shall post hereafter in a conspicuous place, available to employees and applicants for employment, notices to be provided by the Commission setting forth the provisions of the Fair Employment Practices Law of the Commonwealth (G.L. Chapter 151 B).

2. In connection with the performance of work under this contract, the Contractor shall undertake in good faith affirmative action measures designed to eliminate any discriminatory barriers in the terms and conditions of employment on the grounds of race, color, religious creed, national origin, age, sex, or handicap, and to eliminate and remedy any effects of such discrimination in the past. Such affirmative action shall entail positive and aggressive measures to ensure equal opportunity in the areas of apprenticeship training programs. This affirmative action shall include all action required to guarantee equal employment opportunity for all persons, regardless of race, color, religious creed, national origin, age, sex, or handicap. The purpose of this provision is to ensure to the fullest extent possible an adequate supply of skilled tradesmen for this and future City public construction projects.

II. OBLIGATION

1. As part of the obligation of remedial action under the foregoing section, the Contractor shall maintain goals on this project no less than thirty eight percent (38%) minority employee and ten percent (10%) women employee hours of the total work hours in each job category including but not limited to, bricklayers, carpenters, cement masons, electricians, iron workers, operating engineers, and those "classes of work" enumerated in G.L. c. 149, Sec. 44F.

2. In the hiring of minority and women journeymen, apprentices, trainees and advanced trainees, the Contractor shall rely on referrals from a multi-employer affirmative action program approved by the City, traditional referral methods used by the construction industry, and referrals from agencies, not more than three (3) in number at any one time, designated by the City.

III. REPORTS

1. Contractor shall prepare projected manning tables on a quarterly basis, **Quarterly Projected Workforce Table, E00-105.** These shall be broken down into projections by week, for workers required in each trade. Copies shall be furnished to the City one week in advance of the commencement of the period covered, and at such time as there is a need to be updated during the period.

2. The Contractor shall prepare records of employment referral orders, shall be made available to the City on request.

3. The Contractor shall prepare the **Certified Payroll Report on a weekly basis,** which lists the hours worked in each trade by each employee identified as minority, non-minority, male and female. Copies of these shall be provided to the City at the end of each week.

IV. SUBCONTRACTING WORK

If the Contractor shall use any Subcontractor on any work performed under this contract, affirmative action shall be taken to negotiate with qualified minority and women contractors. This affirmative action shall cover both pre-bid and post-bid periods.

V. EMPLOYMENT

In the employment of journeymen, apprentices, trainees, and advanced trainees, the Contractor shall give preference, first to citizens of the Commonwealth who have served in the armed forces of the United States in time of war and have been honorably discharged there from or released from active duty therein, and who are qualified to perform the work to which the employment relates, and, secondly, to make reasonable efforts to employ citizens of the Commonwealth generally, and, if such cannot be obtained in sufficient numbers, then to citizens of the United States.

VI. RIGHT OF ACCESS

A designee of the City shall have the right of access to the construction site.

VII. COMPLIANCE WITH REQUIREMENTS

The Contractor shall comply with the provisions of Executive Order No. 452, as amended and of Chapter 151B as amended, of the Massachusetts General Laws.

VIII. NON-DISCRIMINATION

The Contractor, in the performance of all work after the award, and prior to completion of the contract work, will not discriminate on the grounds of race, color, religious creed, national origin, age, sex, or handicap in employment practices, in the selection or retention of other contractors or in the procurement of materials and rentals of equipment.

IX. SOLICITATIONS FOR SUBCONTRACTORS, AND FOR THE PROCUREMENT OF MATERIALS AND EQUIPMENT

The Contractor shall, in writing, notify each entity to which it solicits (either by competitive bidding or negotiation, as applicable) for work under a subcontract or for materials or supplies of the Contractor's obligation relative to non-discrimination and affirmative action.

X. CONTRACTOR'S CERTIFICATION

Contractors bidding as General Contractors or Filed Sub-contractors shall certify that they will comply with the City's workforce goals and business enterprise goals and specific affirmative action steps contained in this Supplemental Equal Employment Opportunity Anti-Discrimination and Affirmative Action Program by signing and submitting with the bid the **Affidavit of Acknowledgement and Certification of Compliance, Form E00-101.**

If any Contractor subcontracts any portion of the work, the Contractor is required to obtain from each Subcontractor, regardless of tier, an Affidavit of Acknowledgement and Certification of Compliance, Form E00-101 **stating** that **it will comply with the minority and women subcontracting and manpower ratios and specific affirmative action steps** contained in this Supplemental Equal
Employment Opportunity Anti-Discrimination and Affirmative Action Program by signing this form and submitting it to the Contractor for submission to the awarding authority not later than five working days following the opening of the bids.

XI. COMPLIANCE – INFORMATION, REPORTS

The Contractor will provide all information and reports required by the City on instructions issued and will permit access to its facilities and any books, records, accounts and other sources of information which may be determined by the City to affect the employment of personnel and the City's supplementary affirmative action contract requirements. Where information required is in the exclusive possession of another who fails or refuses to furnish this information, the Contractor shall so certify to the City and shall set forth what efforts have been made to obtain the information.

XII. SEVERABILITY

The provisions of this Section are severable, and if any of these provisions shall be held unconstitutional by any court of competent jurisdiction, the decisions of such court shall not affect or impair any of the remaining provisions.

XIII. WAIVER

The City reserves the right to waive any stipulation in the M/WBE Program when deemed necessary or appropriate for the general good of the City and its programs.

DEFINITIONS

Contractor - Except where otherwise specifically stated the term "Contractor" shall mean any General Contractor
City - is the City of Worcester, Massachusetts
M/WBE – is A Minority and Women Business Enterprise as certified by the State Office of Minority and Women Business Assistance to be 5l% or more minority or women owned and operated.
Person of Color/People of Color – shall mean individuals who are not classified as non-Hispanic/Latino white. This definition shall also apply to the terms of "Worker of Color" and "Workers of Color."

CITY OF WORCESTER

INITIAL STATEMENT AND CERTIFICATION OF COMPLIANCE WITH THE RESPONSIBLE EMPLOYER ORDINANCE

PROJECT: **CONTRACTOR:**

ALL BIDDERS, PROPOSERS AND ALL SUBCONTRACTORS AND TRADE CONTRACTORS, INCLUDING SUBCONTRATORS NOT SUBJECT TO G.L. c. 149, § 44F, UNDER THE BIDDER FOR PROJECTS SUBJECT TO G.L. c. 149, § 44A(2), AND PROPOSERS FOR PROJECTS SUBJECT TO G.L. c. 149A, SHALL AS A CONDITION TO SUBMITTING A BID OR A PROPOSAL, OR SUBCONTRACTING, OR IN ANY EVENT PRIOR TO ENTERING INTO A SUBCONTRACTOR AT ANY TIER, VERIFY UNDER OATH COMPLIANCE WITH THE FOLLOWING OBLIGATIONS AND FURTHER SHALL CERTIFY SUCH COMPLIANCE ON A WEEKLY BASIS FOR THE DURATION OF THE PROJECT:

1) That the applicable Prevailing Wage Rates shall be paid to all employees and the Weekly Payroll Report Form and Statement of Compliance shall be submitted to the Contract Compliance Office on a weekly basis for the entire duration of the project**;**

2) The contractor and subcontractors shall furnish and maintain appropriate industrial accident insurance coverage, for the duration of the project, for all their respective employees employed on the project in accordance with G.L. c. 152;

3) That the contractor and subcontractors shall properly classify employees on the project as employees rather than independent contractors and treat them accordingly for purposes of workers' compensation insurance coverage, unemployment taxes, social security taxes and income tax withholding. (G.L. c.149, §148B);

4) That at the time employees begin work at the worksite, each employee will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration;

5) That the contractor and subcontractor is in compliance with the health and hospitalization requirements of the Massachusetts Health Care Reform law established by Chapter 58 of the Acts of 2006, as amended, and regulations promulgated pursuant to that statute by the Commonwealth Health Insurance Connector Authority;

6) That the contractor and subcontractor, for the duration of the applicable contractor's and subcontractor's work on the project, shall ensure that each of its employees entering or leaving the project individually completes the appropriate entries in a daily sign-in/sign-out log to be maintained by the contractor;

7) That the contractor is not debarred or otherwise prevented from bidding for or performing work on a public project in the Commonwealth of Massachusetts or in the city of Worcester

THE UNDERSIGNED ACKNOWLEDGES HE/SHE HAS READ THE ABOVE OBLIGATIONS AND CERTIFIES THE CONTRACTOR'S COMPLIANCE WITH THEM.

Signed as a True Statement under Oath:

_____ _____
(Bidder) (Signature)

Date: _____ _____
(Print Name and Corporate Title

(Seal)

RESPONSIBLE EMPLOYER ORDINANCE
and
MINORITY/WOMEN BUSINESS ENTERPRISE AND WORKER UTILIZATION

==========

FORM E00-D/103

SUCCESSFUL BIDDER'S OBLIGATION TO COMPLY WITH PROCEDURES AND FORMS

Successful bidders (may also be referred to as "contractor" on this Form E00-D/103) on City construction projects will receive a package of procedures and forms to be used at specific times throughout the life of the project.

The following is a list of the documents that will be sent to successful bidders when this office is notified that a contract has been, or is about to be, executed. If the successful bidder does not receive this package of procedures and forms, it shall be responsible to promptly contact the Purchasing Division and request said package be provided.

I. BUILDING TRADES – CONTACT LIST, E00-D/6
When a contractor cannot fulfill the worker utilization percentages, the contractor may contact the appropriate building trades locals to request assistance in locating and engaging qualified workers.

II. AFFIDAVIT OF ACKNOWLEDGEMENT and CERTIFICATION OF COMPLIANCE, (FOR SUBCONTRACTORS), E00-101
If any portion of a project is to be subcontracted at any tier, each additional subcontractor shall complete this form and send it to the Contract Compliance Officer within two business days of contract execution and PRIOR to beginning work on the project.

III. TABLE OF PROJECTED SUBCONTRACTORS, E00-103
The contractor shall report the use of subcontractors at any tier to the Contract Compliance Officer on this form prior to the subcontractor beginning work on the project.

IV. SUBCONTRACTOR'S CERTIFICATE OF INTENT TO PARTICIPATE, E00-104
Each non-filed subcontractor engaged to work a project shall complete and forward this form to the Contract Compliance Officer prior to beginning work on the project.

V. QUARTERLY PROJECTED WORKFORCE TABLE, E00-105
Each contractor and subcontractor, regardless of tier, shall complete and forward this form to the Contract Compliance Officer prior to beginning work and again for each additional three month period throughout the life of the project.

VII. INITIAL STATEMENT and CERTIFICATION OF COMPLIANCE WITH THE RESPONSIBLE EMPLOYER ORDINANCE, REO-101 (Pages 1 & 2)

General contractors, trade contractors, and subcontractors shall complete and submit this form as part of their bid on all City construction projects subject to the provisions of G.L. c. 149 and c. 149A.

The REO requirements are applicable under G.L. c. 149 to contracts of $150,000 or more. Under G.L. c. 149A the requirements are applicable only to contracts $5,000,000.00 or more. here is no minimum threshold for subcontractors. Therefore all subcontractors, i.e., trade contractors, and subcontractors at every tier must comply with the requirements of the REO.

The general contractor shall forward all trade contractor's and subcontractor's (at any tier) REO-101 and REO 103 Forms and REO documentation to the Contract Compliance Officer for approval, PRIOR to said subcontractor's beginning work.

VIII. WEEKLY STATEMENT AND CERTIFICATION OF COMPLIANCE WITH THE RESPONSIBLE EMPLOYER ORDINANCE, REO-102

At the end of each week of work, ALL contractors, trade contractors, and subcontractors, regardless of tier, subject to the provisions of G.L. c. 149 and c. 149A, shall complete and submit this form along with their certified payroll reports to the Contract Compliance Officer.

IX. WEEKLY CERTIFIED PAYROLL REPORT and WEEKLY WORKFORCE UTILIZATION REPORT.

At the end of each week of work, all contractors and subcontractors, regardless of tier, shall complete and submit these forms to the Contract Compliance Officer.

The Contract Compliance Office will also accept computer generated payroll reports. However, if the computer payroll does not reflect the prevailing wage, the Contractor must provide a breakdown of the benefits paid to each employee which when added to the base wage equals the prevailing wage.

CITY OF WORCESTER
RESPONSIBLE EMPLOYER ORDINANCE REQUIREMENTS

PROJECT: **CONTRACTOR:**

POST CONTRACT AWARD SUBMISSIONS

THE GENERAL CONTRACTOR, CONSTRUCTION MANAGER AT RISK, TRADE CONTRACTORS AND SUBCONTRACTORS, INCLUDING SUBCONTRATORS THAT ARE NOT SUBJECT TO G.L. c. 149, §44F, AND THE GENERAL CONTRACTOR FOR PROJECTS SUBJECT TO G.L. c. 149, §44A(2) AND THE CONSTRUCTION MANAGER AT RISK FOR PROJECTS SUBJECT TO G.L. c. 149A, SHALL SUBMIT THE FOLLOWING INFORMATION AS OUTLINED BELOW FOR THE DURATION OF THE PROJECT:

1. PRIOR TO EACH EMPLOYEE BEGINNING WORK AT THE WORKSITE, IT SHALL SUBMIT DOCUMENTATION EVIDENCING THE EMPLOYEE'S SUCCESSFUL COMPLETION OF A COURSE IN CONSTRUCTION SAFETY AND HEALTH THAT IS APPROVED BY THE UNITED STATES OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION. A QUALIFYING PROGRAM MUST BE A MINIMUM OF TEN HOURS IN DURATION.

2. ON A DAILY BASIS, SUBMIT DAILY SIGN-IN/SIGN-OUT LOGS COMPLETED BY EACH INDIVIDUAL EMPLOYEE ENTERING OR LEAVING THE WORKSITE. THE LOG SHALL INCLUDE THE FOLLOWING: THE LOCATION OF THE PROJECT; CURRENT DATE; PRINTED EMPLOYEE NAME; SIGNED EMPLOYEE NAME; AND THE TIME OF EACH ENTRY OR EXIT. THE LOG SHALL ALSO INCLUDE A PROMINENT NOTICE THAT EMPLOYEES ARE ENTITLED UNDER STATE LAW TO RECEIVE THE PREVAILING WAGE RATE FOR THEIR WORK ON THE PROJECT.

END OF SECTION

WAGE THEFT PREVENTION CERTIFICATION

By the Revised Ordinances, Chapter 2, Section 39, the city of Worcester has established requirements for certain contracts in an effort to prevent wage theft. Prospective contractors must provide the following certification and disclosures with their bids/proposals. The City will not award a contract without receipt of this completed certification.

INSTRUCTIONS: A prospective contractor shall **(a)** check Box 1 *OR* Box 2, as applicable, **(b)** check Boxes 3-5, **(c)** sign this form certifying compliance with the Wage Theft Prevention Ordinance, and **(d)** submit the completed form with its bid/proposal. For multi-year contracts, the successful bidder/proposer shall submit the completed form annually to the Purchasing Director.

Pursuant to the Wage Theft Prevention Ordinance, successful bidders/proposals shall post in conspicuous places the Mass. Wage and Hour Laws notice informing employees of the protections of G.L. c. 149, Sec. 151, and the Fair Labor Standards Act (FLSA). The notice may be found at http://www.mass.gov/ago/docs/workplace/wage/wagehourposter.pdf

ALL BIDDERS/PROPOSERS MUST CERTIFY THAT [**check either Box 1 or Box 2, as applicable**]

1. ☐ Neither this vendor/contractor nor any prospective subcontractor has been subject to a federal or state criminal or civil judgment, administrative citation, final administrative determination, order or debarment resulting from a violation of G.L. c. 149, G.L. c. 151, or FLSA, within three (3) years prior to the date of this bid/proposal submission.

OR

2. ☐ This vendor/contractor, or a prospective subcontractor, has been subject to a federal or state criminal or civil judgment, administrative citation, final administrative determination, or debarment resulting from a violation of G.L. c. 149, G.L. c. 151, or FLSA, within three (3) years prior to the date of this bid/proposal submission. The firm shall provide a copy of the same with the bid/proposal.

ALL BIDDERS/PROPOSERS MUST CERTIFY EACH OF THE FOLLOWING

3. ☐ Within five (5) days of receiving notice, the vendor/contractor shall report and provide a copy of any federal or state criminal or civil judgment, administrative citation, final administrative determination, order or debarment resulting from a violation of G.L. c. 149, G.L. c. 151, or FLSA imposed on this firm or on any prospective subcontractor while any bid/proposal to the City is pending and, if awarded a contract, during the term of the contract provide the same to the Purchasing Director.

4. ☐ A vendor/contractor awarded a contract that has disclosed under paragraph 3 above shall, upon request, furnish monthly certified payrolls for the City contract as the Purchasing Director instructs and shall, at the discretion of the Purchasing Director, obtain a wage/payment bond or other suitable insurance as required by the Wage Theft Prevention Ordinance. Vendors/contractors subject to a state or federal debarment for violation of the above laws or prohibited from contracting with the Commonwealth are prohibited from contracting with the City, and upon a finding or order of debarment or prohibition, the City may terminate the contract.

5. ☐ The contractor shall post notices provided by the City in conspicuous places informing employees of the protections of the Wage Theft Prevention Ordinance, and applicable local, state and federal law.

The undersigned certifies under the pains and penalties of perjury that the contractor is in compliance and agrees to remain in compliance with the provisions of the Wage Theft Prevention Ordinance for the term of its contract with the City.

Signed:_____ _____ _____

Print Name & Title **Company Name** **Date**

CORI COMPLIANCE / GENDER IDENTITY & EXPRESSION

Vendors entering into contracts with the City of Worcester must affirm that their policies regarding CORI information are consistent with the CORI hiring standards set by the City of Worcester. The City's CORI hiring policy may be downloaded from City of Worcester website www.worcesterma.gov. Questions pertaining to the City's CORI hiring policy are to be directed to the Equal Employment Opportunity Officer, Executive Office of Human Resources at 508-799-1030.

CERTIFICATION

All Vendors must check one of the three lines below.

1. _____ CORI checks are not performed on any Applicants.

2. _____ CORI checks are performed on some or all Applicants. The Vendor, by affixing a signature below, affirms under penalties of perjury that its CORI policy is consistent with the standards set forth with the CORI hiring standards set by the City of Worcester.

3. _____ CORI checks are performed on some or all Applicants. The Vendor's CORI policy is not consistent with the standards set forth with the CORI hiring standards set by the City of Worcester. (a copy of the Vendor's written CORI policy must accompany this form).

_____ _____
(Typed or printed name of person signing quotation, bid or proposal) Signature

_____
Name of Business

A Vendor with a CORI policy that does NOT conform to the City standards must check Line 3. Vendors who check Line 3 will not be permitted to enter into contracts with the City, absent a waiver granted by the City. For any waiver to be granted, a written request should accompany bid submission explaining in detail why the vendor fails or refuses to comply with the City's CORI hiring standards.

Gender Identity Standards Applicable to Vendors

The city will do business only with vendors that have adopted and employ Gender Identity policies, practices and standards that are consistent with city standards.

The city may review all vendors' Gender Identity policies and practices for consistency with city standards.

By signing this bid, vendor confirms that their Gender Identity policies, practices and standards are consistent with those of the City of Worcester. For further information please refer to the Ordinance Relative to Gender Identity and Expression found at www.worcesterma.gov or call the LGBTQ Liaison/Director of Human Rights & Disabilities at 508-799-8486.

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2 C.F.R. Pt. 200, App. II

APPENDIX II TO PART 200—CONTRACT PROVISIONS FOR NON–FEDERAL ENTITY CONTRACTS UNDER FEDERAL AWARDS

Effective: November 12, 2020

In addition to other provisions required by the Federal agency or non–Federal entity, all contracts made by the non–Federal entity under the Federal award must contain provisions covering the following, as applicable.

(A) Contracts for more than the simplified acquisition threshold, which is the inflation adjusted amount determined by the Civilian Agency Acquisition Council and the Defense Acquisition Regulations Council (Councils) as authorized by 41 U.S.C. 1908, must address administrative, contractual, or legal remedies in instances where contractors violate or breach contract terms, and provide for such sanctions and penalties as appropriate.

(B) All contracts in excess of $10,000 must address termination for cause and for convenience by the non–Federal entity including the manner by which it will be effected and the basis for settlement.

(C) Equal Employment Opportunity. Except as otherwise provided under 41 CFR Part 60, all contracts that meet the definition of "federally assisted construction contract" in 41 CFR Part 60–1.3 must include the equal opportunity clause provided under 41 CFR 60–1.4(b), in accordance with Executive Order 11246, "Equal Employment Opportunity" (30 FR 12319, 12935, 3 CFR Part, 1964–1965 Comp., p. 339), as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and implementing regulations at 41 CFR part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor."

(D) Davis–Bacon Act, as amended (40 U.S.C. 3141–3148). When required by Federal program legislation, all prime construction contracts in excess of $2,000 awarded by non–Federal entities must include a provision for compliance with the Davis–Bacon Act (40 U.S.C. 3141–3144, and 3146–3148) as supplemented by Department of Labor regulations (29 CFR Part 5, "Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction"). In accordance with the statute, contractors must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, contractors must be required to pay wages not less than once a week. The non–Federal entity must place a copy of the current prevailing wage determination issued by the Department of Labor in each solicitation. The decision to award a contract or subcontract must be conditioned upon the acceptance of the wage determination. The non–Federal entity must report all suspected or reported violations to the Federal awarding agency. The contracts must also include a provision for compliance with the Copeland "Anti–Kickback" Act (40 U.S.C. 3145), as supplemented by Department of Labor regulations (29 CFR Part 3, "Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States"). The Act provides that each contractor or subrecipient must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled. The non–Federal entity must report all suspected or reported violations to the Federal awarding agency.

(E) Contract Work Hours and Safety Standards Act (40 U.S.C. 3701–3708). Where applicable, all contracts awarded by the non–Federal entity in excess of $100,000 that involve the employment of mechanics or laborers must include a provision for compliance with 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5). Under 40 U.S.C. 3702 of the Act, each contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

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(F) Rights to Inventions Made Under a Contract or Agreement. If the Federal award meets the definition of "funding agreement" under 37 CFR § 401.2 (a) and the recipient or subrecipient wishes to enter into a contract with a small business firm or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under that "funding agreement," the recipient or subrecipient must comply with the requirements of 37 CFR Part 401, "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements," and any implementing regulations issued by the awarding agency.

(G) Clean Air Act (42 U.S.C. 7401–7671q.) and the Federal Water Pollution Control Act (33 U.S.C. 1251–1387), as amended—Contracts and subgrants of amounts in excess of $150,000 must contain a provision that requires the non–Federal award to agree to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401–7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251–1387). Violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA).

(H) Debarment and Suspension (Executive Orders 12549 and 12689)—A contract award (see 2 CFR 180.220) must not be made to parties listed on the governmentwide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 CFR 180 that implement Executive Orders 12549 (3 CFR part 1986 Comp., p. 189) and 12689 (3 CFR part 1989 Comp., p. 235), "Debarment and Suspension." SAM Exclusions contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549.

(I) Byrd Anti–Lobbying Amendment (31 U.S.C. 1352)—Contractors that apply or bid for an award exceeding $100,000 must file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier must also disclose any lobbying with non–Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the non–Federal award.

(J) See § 200.323.

(K) See § 200.216.

(L) See § 200.322.

Credits

[79 FR 75888, Dec. 19, 2014; 85 FR 49577, Aug. 13, 2020]

SOURCE: Section also affected by: 69 FR 26280, May 11, 2004; 78 FR 78608, Dec. 26, 2013; Section also affected by: 78 FR 78608, Dec. 26, 2013, unless otherwise noted.

AUTHORITY: 31 U.S.C. 503

Current through July 12, 2023, 88 FR 44593. Some sections may be more current. See credits for details.

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SECTION 01 01 00

SUMMARY OF WORK

PART 1 – GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 SUBSTANTIAL COMPLETION

A. The Date of Substantial Completion shall be August 21, 2026. The Contractor shall obtain a Certificate of Occupancy on or before the Date of Substantial Completion.

1.03 PROJECT DESCRIPTION

A. Challenge & Reach Academy
   1. The Work for the Challenge & Reach Academy shall consist of selective demolition; toilet and stair renovation; and all repairs outlined in the Contract Documents.

B. Gerard Creamer Center
   1. The Work for the Gerard Creamer Center shall consist of selective demolition, toilet and stair renovation; new doors and door frames; and all repairs outlined in the Contract Documents.

C. Lincoln Elementary School
   1. The Work for the Lincoln Elementary School consist of selective demolition; steel framing; modification of existing roof; new ceilings and wall partitions; new elevator; new FP, plumbing, HVAC, and electrical; site work; and all repairs outlined in the Contract Documents.

D. Thorndyke Road Elementary School
   1. The Work for the Thorndyke Road Elementary School consist of selective demolition; steel framing; modification of existing roof; new ceilings and wall partitions; new elevator; new FP, plumbing, HVAC, and electrical; site work; and all repairs outlined in the Contract Documents.

1.04 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
   2. Section 02 41 13 - Selective Demolition
   3. Section 03 54 13 - Cementitious Underlayment
   4. Section 04 20 00 – Unit Masonry

5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.05 RELATED WORK UNDER OTHER CONTRACTS

A. Work by other contractors, which will be under separate contract, may take place during the work of this contract adjacent to and within the work areas of this site. This work, under other contract, shall be coordinated between the different General Contractors. The security system will be installed by the Owner under separate Contract and the general Contractor shall work with the Owners vendor to coordinate their work with the General contractor's work.

B. Cooperate fully with separate contractors so that work under those contracts may be carried out smoothly, without interfering with or delaying the work under this contract.

1.06 CONSTRUCTION MANAGEMENT PLAN

A. The Contractor shall be required to prepare a detailed Construction Management Plan (CMP) which must be approved by the owner prior to the start of construction. The CMP will include all the measures the Contractor determines are necessary to successfully complete the project while minimizing project impacts on the school, neighbors and surrounding community. The Contractor should assume that the nearby residences are occupied. The Contractor should assume that the school can be fully operating during events at the school on any given day and time.

B. The CMP must include, but shall not be limited to, the Contractors proposed procedures for following items: a. Work logistics plan: A description of how of the Work will be phased and sequenced to minimize disruption to individual spaces and sections of the building. i) Work hour limitations:

1. During school summer recess-Normal work hours shall be two shifts, 1st shift from 7:00am - 3:00pm, 2nd shift from 2:00pm – 10:00 pm. Work hours when students are present shall be 3:00pm to 10:30 pm. No noise work shall commence prior to 7:00am, per local ordinance.
2. Fees for Worcester Public Schools Staff to be present outside of these hours, to be paid by the General Contractor. The contractor shall pay fees for OPM cost and Clerk of works to be on site for other than normal work hours.

3. Notification procedures regarding weekend, early or late day work:
    a. Provide 48 hour written notification to the OPM and Worcester Public School for work performed during Saturday hours; Work is permitted during school vacations.
4. No work shall be performed during late evening hours or on Sunday.

C. Refer to Worcester Public School Calendar at the end of this Section.

1.07 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies; perform demolition work in accordance with applicable rules, regulations, codes, and ordinances of local, state, and federal authorities.

B. Obtain and pay for necessary building permits, licenses and certificates and give notices as required during the performance of the Work.

C. Provide 4 copies of shop drawings and literature for Architects review and approval for the items referenced in the specifications.

D. Provide schedule and work plan within one week of the contract signing.

E. Attend weekly meetings (or as scheduled) with the Architect and Owner's Representative as scheduled.

F. Provide all Closeout documents including final acceptance, warranties, guaranties, and bonds.

1.08 WORK SEQUENCE SCHEDULING AND COORDINATION

A. The Work shall be sequenced, scheduled, and coordinated to achieve the Date of Substantial Completion.
    1. All deliveries must be scheduled for a minimum of 48 hours in advance with the Architect and Owner.
    2. All existing utility tie-ins must be scheduled and coordinated at a minimum of 72 hours in advance with the Architect and Owner.

B. The General Contractor and each Sub-Contractor shall establish and increase or decrease as appropriate the workforce, days of work, number of shifts, work hours, materials, tools, and equipment needed to maintain and achieve the Date of Substantial Completion.

C. The General Contractor and each Sub-Contractor shall increase the workforce, days of work, number of shifts, work hours, materials, tools, and equipment needed to maintain the Date of Substantial Completion as necessary to accommodate any additional work authorized by Construction Change Directives and Change Orders modifications.

D. The General Contractor will be responsible for the proper conduct of the work to ensure that all trades work together, and in harmony, to achieve substantial and final completion as specified.

1.09 WORK HOURS

A. Normal working hours are to be Monday through Friday from 7:00 AM to 3:30 PM, except Legal Holidays. Any working hours outside of these times shall be considered "Extended Hours" and treated as described below.

B. Extended work hours shall require prior scheduling and coordination with the Architect and Owner at a minimum of 48 hours in advance. Extended work hours on Sundays and Legal Holidays may also require a permit from the Police Department.

1. Upon permission from the Architect and Owner, and prior to the start of any extended work, pay for all fees and obtain through the City of Worcester Police Department a work permit for all Sundays and Legal Holidays.

C. The Contractor shall pay any overtime required for the City's Clerk of Works/Owner's Representative to be on site for any work performed outside of normal working hours as defined above. No work shall take place outside of normal working hours without prior approval and the City's Clerk of Works/Owner's Representative on site.

D. Any project related activities may not interfere with the enjoyment and use of abutting areas within the building or adjacent properties during any extended work hours.

1.10 CONTRACTOR USE OF THE PREMISES

A. General Contractor shall have use of the site from date of contract to the Date of Substantial Completion as described above in the Work Hours paragraph.

B. Construction vehicle access and deliveries to the project shall be made during working hours.

C. All contractor personnel shall enter and exit the construction area through Access Driveway.

D. Do not close or obstruct the parking lot, driveways, or sidewalks without the proper permit. Conduct operations with minimum traffic interference.

E. The General Contractor shall also be responsible for returning the public areas adjacent to each work area to their original state prior to the start of work in that area.

F. The use of internal combustion engine driven power equipment is prohibited within the building. Alternate power sources, i.e. generators and compressors, may be placed outside the building to provide power to equipment. Placement of any alternate power sources shall be subject to prior Architect and Owner approval.

G. There will be no washing or washing of any vehicles at the project site. The contractor shall make necessary provisions to accommodate this work off site.

H. All cleaning and washing of tools and/or equipment shall be performed in areas designated only by the Architect. This will be strictly enforced.

1.11 CONTRACTOR USE OF CITY STREETS

A. The General Contractor's personnel, and all other personnel employed on the project, shall limit their parking on the site to within the areas designated for construction parking and as permitted by the General Contractor. Additionally, Contractor personnel may park as legally allowed within City Limits. Parking on street sidewalks is prohibited.

B. Driveway entrances, walks, and yards to abutting properties shall be always kept unobstructed.

1.12 WORK CONDITIONS

A. Neither the General Contractor, nor Sub-Contractors at any level, nor their employees shall bring illegal substances or alcoholic beverages on the premises.

B. Vulgar, abusive, obscene language or behavior will not be tolerated.

C. The Contractor's personnel engaging in the above shall be removed from the jobsite.

D. Radios or any type of "music" broadcasting systems are not allowed.

E. This site is smoke-free; therefore, smoking is prohibited within the site limits.

1.13 PROJECT MANAGER, SUPERINTENDENTS, FIELD ENGINEER AND FOREMAN

A. The General Contractor shall provide a qualified General Superintendent, who shall be present, full time, on site daily during all work in progress until the Date of Substantial Completion, and for such additional time thereafter as the Architect may determine. Only under extenuating circumstances, with the approval of the Architect and Owner, will the Contractor be allowed to substitute for the General Superintendent prior to the date of Final Completion.

B. The General Superintendent shall supervise and direct the activities of other superintendents and foremen on site. He shall not perform the work of foremen, tradesmen, or home office staff.

C. Each filed sub-bidder and each subcontractor shall provide a Lead Foreman, responsible to be on site full time during the workday.

D. Each foreman, in addition to his regular duties shall be responsible for establishing, maintaining, and providing record drawings, which are required to be updated prior to submitting the current period's draft Application for Payment.

E. The General Superintendent and Lead Foreman shall not be discharged or changed without prior written consent of the Architect, which will not be unreasonably withheld. The Architect will require that all as-built information be updated and current prior to granting consent.

1.14 DAILY REPORTS AND WEEKLY OUTLINE SCHEDULE

A. The General Superintendent shall provide a "Daily Report" to the Clerk of Works containing the following:
   1. Name and manpower of each Contractor filed Sub-Contractor and Subcontractor.
   2. Equipment used.
   3. Delivery of products received on site.
   4. Weather conditions at the start and end of each day and any significant changes or events during the day.
   5. Significant problems, hazards or accidental injury occurring during each shift.
   6. Summary of progress made each day.

B. A photocopy may be made of the same "Daily Report," containing the information above, that is used by the General Superintendent. The General Superintendent may obscure confidential portions of his "Daily Report" if desired. Reports are due the following day.

C. The Superintendent shall provide the Clerk of Works a written "Weekly (look ahead) Outline Schedule" of work activities planned at the beginning of each week, for that week. The "Weekly Outline Schedule" may be a simple listing of each trade's activities delineating areas where work is to be scheduled. Note any significant milestones.

1.15 CERTIFICATE OF SUBSTANTIAL COMPLETION

A. The Architect shall issue a Certificate of Substantial Completion for the work when and if all the following conditions have been met:
   1. The work is sufficiently complete to allow the Owner beneficial use of the premises. The work remaining to be done is not a danger to the proposed occupants and is of a minor nature.
   2. The work is sufficiently complete that the Architect may make affidavits to the Building Official as required by Controlled Construction provisions of the Building Code.
   3. The mechanical and electrical systems are fully operational. Required inspections and tests have been successfully completed, and the Owner has been provided instructions regarding operation and maintenance of mechanical and electrical systems in the building.
   4. The Contractor has made notifications required to pay cost of final billing for utilities and termination of property insurance.
   5. The Owner has made notifications required to assume the future cost of utilities and provide property insurance.
   6. The Building Official has issued a Certificate of Occupancy without restrictions or conditions relating to the contractor's work.

1.16 CITY OF WORCESTER ORDINANCES, LICENSES, PERMITS, AND FEES

A. All Contractors shall comply with City Ordinances which may affect the work of this contract, and which have not been previously covered in the Contract Documents. Requirements and fees listed are those in effect as of this writing and each Contractor shall be responsible for verifying the requirements and fee cost as currently in effect and throughout the duration of this project. This includes, but is not limited to, the following:
   1. Worcester Police Department:
      b. Police Details
         1) Hourly rate for one-half day or full day.
      c. Permits for Sunday and Holiday work.
         1) Fee Required.
   2. Department of Public Works, Permits Division
      a. Street Opening Permit Bond
         1) $ 5,000.00
      b. Barricade Placement by DPW
         1) 1st $85 per day
         2) Each additional $ 40 per day
      c. Drainlayers License
         1) New $ 200.00
         2) Annual Renewal $ 100.00
      d. Drain Permit
         1) $ 180.00
      e. Main Inspection
         1) $ 2.90 per Foot

f. Assessment
    1) To be Determined
g. Plan Review
    1) $ 100.00
h. Street Obstruction
    1) $ 150.00 each
i. Street Obstruction (Blanket Permit)
    1) $ 1,000.00 per year
j. Street Opening
    1) Pavement older than 5 years $ 156.00
    2) Pavement 5 years old or less $ 300.00
k. Driveway Opening
    1) Permit $ 156.00
l. Wastewater Discharge
    1) Permit $ 250.00
    2) Inspection $ 400.00
    3) Sewer use $ 6.29/CCF
m. Water meter, etc. Contact the Water Department at 508-799-1492.
n. Traffic and Parking. Contact Department at 508-799-1468.

3. Worcester Fire Department
    a. Fire and Smoke Alarm
    b. Automatic Sprinkler and Standpipes
    c. Contact Worcester Fire Department at 508-799-1826.
    d. Compliance with NFPA 241
4. Department of Inspectional Services
    a. Building Permit
        1) Based on total contract price
            a) $11/$1,000 up to the first million dollars.
            b) $8.00 per $1,000.00 over $1,000,000.
        2) Orders of Building Official under Chapter 1, 780 CMR.
        3) Ticket violation under Chapter 33, 780 CMR.
    b. Trash Control
        1) Ticket for Violations
    c. Environmental Control
        1) Air, Water, Noise Pollution - Ticket for Violations
        2) Conservation Commission Enforcement Officer

1.17 UTILITY COMPANY BACKCHARGES

A. The Electric back charge from N-GRID or Verizon Communications are not known at this time, the Electrical Contractor shall file for all N-Grid and Verizon permits and submit all data and documents as required and shall pay the required permit and inspection fees. The actual cost of the N-Grid back charge shall be paid by the City directly. All related inspection costs or other fees shall be paid as part of the Contract.

PART 2 – PRODUCTS NOT USED

PART 3 – EXECUTION NOT USED

END OF SECTION

Worcester Public Schools Calendar 2024-2025

AUGUST 2024						
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SEPTEMBER 2024						
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DECEMBER 2024						
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No School Days

September 2: Labor Day
October 14: Indigenous People's Day / Columbus Day
November 5: Staff Development Day
November 11: Veterans' Day
November 27 – 29: Thanksgiving
December 23 – 31: Holiday Vacation
January 1: New Year's Day
January 2 – 3: Non-School Day
January 20: Martin Luther King Day
February 17: Presidents' Day
February 18 – 21: Winter Vacation
March 4: Staff Development Day
April 18: Non-School Day
April 21: Patriots' Day
April 22 – 25: Spring Vacation
May 26: Memorial Day
June 19: Juneteenth Day
July 4: Independence Day

Dates to Remember

August 22 – 23: Teacher / Staff Reporting
August 26: First Day of School
August 29: First Day for PreK & K
November 1: End of Quarter 1
January 24: End of Quarter 2
April 11: End of Quarter 3
May 29: Last day of School for Seniors
June 4: Kindergarten Open House
***June 16:** End of Quarter 4 / Last day of School

Other Major Religious & Cultural Days

October 2: Rosh Hashanah Begins
October 11: Yom Kippur Begins
November 1: Diwali Begins
December 25: Hanukkah Begins
December 26: Kwanzaa Begins
January 6: Three Kings Day
January 29: Lunar New Year
February 28: Ramadan Begins
March 5: Ash Wednesday
March 30: Eid al-Fitr Begins
April 12: Passover
April 18: Good Friday
April 20: Easter/Orthodox Easter
June 6: Eid al-Adha Begins

= DAYS WHEN SCHOOL IS NOT IN SESSION FOR STUDENTS

**Last day of school may change in response to the number of snow days used during the school year*

***Major Religious & Cultural Days:** Be cognizant of the variety religious holidays when planning events*

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Worcester Public Schools Calendar 2025-2026

AUGUST 2025						
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SEPTEMBER 2025						
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DECEMBER 2025						
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JUNE 2026						
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January 6: Three Kings Day
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February 18: Ramadan Begins
February 18: Ash Wednesday
March 19: Eid al-Fitr Begins
April 1: Passover
April 3: Good Friday
April 5: Easter
April 13: Orthodox Easter
May 7: Eid al-Adha Begins

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SECTION 01 04 50

CUTTING AND PATCHING

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 SUMMARY

A. This Section specifies administrative and procedural requirements for cutting and patching work not specified elsewhere.

B. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1. Requirements of this Section apply to all Sections of the Specifications, including mechanical and electrical installations.

C. Any finished new work required to be cut out due to lack of coordination and scheduling will be repaired by the trade causing cutting and patching to be done. This work will be done at no additional cost to the Owner.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
2. Section 02 41 13 - Selective Demolition
3. Section 03 54 13 - Cementitious Underlayment
4. Section 04 20 00 – Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning

16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.04 SUBMITTALS

A. Cutting and Patching Proposal: Where approval of procedures for cutting and patching is required before proceeding, submit a proposal describing procedures seven (7) days in advance of the time cutting and patching will be performed and request approval to proceed. Include the following information, as applicable, in the proposal:

1. Describe the extent of cutting and patching required. Show how it will be performed and indicate why it cannot be avoided.
2. Describe anticipated results in terms of changes to existing construction; include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.
3. List products to be used and firms or entities that will perform Work.
4. Indicate dates when cutting and patching will be performed.
5. List utilities that will be disturbed or affected, including those that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.
6. Where cutting and patching involves adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with the original structure.
7. Approval by the Architect to proceed with cutting and patching does not waive the Architect's right to later require complete removal and replacement of unsatisfactory work.

1.05 QUALITY ASSURANCE

A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.

1. Obtain approval of the cutting and patching proposal before cutting and patching the following structural elements:
    a. Foundation construction.
    b. Bearing walls.
    c. Structural concrete.
    d. Lintels.
    e. Structural decking.
    f. Miscellaneous structural metals.
    g. Piping, ductwork, and equipment.

B. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.

1. Obtain approval of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems:
    a. Primary operational systems and equipment.

b. Air or smoke barriers.
c. Water, moisture, or vapor barriers.
d. Membranes and flashing.
e. Control systems.
f. Communication systems.

C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

1. If possible, retain the original installer or fabricator to cut and patch the following categories of exposed Work, or if it is not possible to engage the original installer or fabricator, engage another recognized experienced and specialized firm:

a. Acoustical ceilings.
b. Carpeting.
c. Vinyl flooring.

1.06 WARRANTY

A. Existing Warranties: Replace, patch, and repair material and surfaces cut or damaged by methods and with material in such a manner so as not to void any existing warranties.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that fully match existing adjacent surfaces possible regarding visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

PART 3 - EXECUTION

3.01 INSPECTION

A. Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.

1. Before proceeding, meet at the site with parties involved in cutting and patching. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

B. All cutting and patching by all trades shall be done under the direction and coordination of the General Contractor. Accurately lay out all conduit runs, piping, recessed items, etc.

C. Inspect existing conditions of project, including elements subject to damage or to movement, during cutting and patching.

D. After uncovering work, inspect conditions affecting installation of products, or performance of work.

E. Report unsatisfactory or questionable conditions to the Architect in writing; do not proceed with work until Architect has provided further instructions.

F. No holes or slots shall be drilled through any structural member. Inspect holes after finishes have been removed to assure that substrate is not structural. No holes to be blindly drilled through walls, ceilings, etc.

3.02 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.

C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Take all precautions necessary to avoid cutting existing pipe, conduit or ductwork serving the building.

E. Provide adequate temporary support as necessary to assure structural value or integrity of affected portion of work.

F. Provide devices and methods to protect other portions of project from damage.

G. Provide protection from elements for that portion of the project, which may be exposed by cutting and patching work.

3.03 PERFORMANCE

A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.

1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

B. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction.

1. In general, where cutting is required, use hand or small power tools designed for sawing or grinding, not hammering, and chopping. Cut holes and slots as small as possible, neatly to size required, with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
3. Cut through concrete and masonry using a cutting machine, such as a carborundum saw or diamond core drill.
4. Comply with requirements of applicable Sections of Division 2 where cutting and patching requires excavating and backfilling.

C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
   1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
   2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

D. Execute cutting and demolition by methods, which will prevent damage to other work, and will provide proper surfaces to receive installation of repairs.

E. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes.

F. Restore work, which has been cut or removed to match the original adjacent surfaces exactly in color, material, and texture. Include repainting of new work. Install new products to provide completed work in accordance with requirements of Contract Documents.

G. Fit works airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces. All penetrations through separation walls shall be sealed with fire stopping sealant. All penetrations through foundations and exterior walls shall be sealed watertight and shall include proper flashings, drip loops, weatherproof covers, etc. as necessary.

H. Dust and debris from cutting shall be cleaned up immediately after.

3.04 HOLES

A. The General Contractor and subcontractors shall drill all their own holes if sleeves were missed, improperly placed, or not large enough. Holes made by the General Contractor and subcontractors shall be accurate and neat and not just punched out. No long slots shall be made where piping or conduit may be placed in individual holes. No cutting or patching shall be done which, in the opinion of the Architect, will endanger or impair construction or finish.

B. No cores shall be drilled in concrete walls or slabs more than six (6) inches without prior approval from the Structural Engineer. The Structural Engineer must approve any cutting of structural steel.

C. Holes cut in fire-resistive walls and floors shall be neatly made and consistent with listing for firestopping assembly to be used.

3.05 CLEANING

A. Thoroughly and completely clean areas and spaces where cutting and patching is performed or used as access. Remove paint, mortar, oils, putty, and items of similar nature. Thoroughly clean piping, conduit, and similar features before painting or other finish is applied. Restore damaged pipe covering to its original conditions.

END OF SECTION

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SECTION 01 20 00

PROJECT MEETINGS

PART 1 – GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 SUMMARY

A. This Section specifies administrative and procedural requirements for project meetings, including, but not limited to, the following:
   1. Pre-Construction Conference.
   2. Pre-Installation Conference.
   3. Bi-Weekly Progress Meetings.
   4. Coordination Meetings.
   5. Project Closeout Conference.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Division 1 Section 012900 “Applications for Payment” for procedures on submitting requisitions.
   2. Division 1 Section 013100 “Project Coordination” for procedures for coordinating project meetings with other construction activities.
   3. Division 1 Section 013300 “Submittal Procedures” for submitting the Contractor's Construction Schedule.
   4. Division 1 Section 017700 “Project Closeout” for procedures and issues surrounding Project Completion.

1.03 PRE-CONSTRUCTION CONFERENCE

A. Schedule a pre-construction conference before starting construction, immediately after execution of the Agreement. The conference is to be held at the Project Site, or other agreed upon location, at a time convenient to both the Owner and Architect. Conduct the meeting to review responsibilities and personnel assignments. Submit agenda to Architect and Owner three (3) days prior to meeting date.

C. Attendees: Authorized representatives of the Owner, Architect, and their consultants; the Contractor and its superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.

D. Agenda: Discuss items of significance that could affect progress, including the following:
   1. Introduction to All Project Members.
   2. Distribution of Contract Documents.

3. Procedures Outlined for Contract Compliance Issues.
4. Tentative Construction Schedule; Making Notes of Critical Dates.
5. Critical Work Sequencing.
6. Pre-Installation Conferences.
7. Work Hours.
8. Use of the Premises.
9. Deliveries.
10. Security Procedures.
11. Parking and Site Access Issues.
12. Office, Work, and Storage Areas.
13. Housekeeping & Cleaning of Construction Areas.
14. Safety Procedures.
15. First Aid.
16. Procedures for Creating Monthly Cash Flow/Schedule.
17. Procedures for processing Draft Application for Payment Periodic Submittals Certification Statement.
18. Procedures for processing Applications for Payment.
19. Procedures for RFI's, SI's, RFP's, COP's, CCD's, CO's, etc.
20. Procedures for Keeping Logs on RFI's, SI's, RFP's, COP's, CCD's, CO's, etc.
21. Project Coordination Procedures & Drawings.
22. Project Meetings & Meeting Minutes.
23. Unit Prices.
24. Procedures for Submittals.
25. Quality Control, Inspections, and Testing.
26. Temporary Facilities.
27. Preparation of Project Closeout Documents.

E. The Contractor shall record and promptly distribute minutes of this meeting to all project members (in attendance or not), including the Architect and Owner, and as additionally directed by the Architect.

1. Meeting Minutes shall be in a standard type-written format to remain consistent for every project meeting and include, but not limited to, the following items:
   a. Detailed notes from all discussions of project business items in chronological order.
   b. Updated Project Contractor, Subcontractor, Vendor List.
   c. Updated Construction Schedule.

1.04 PRE-INSTALLATION CONFERENCES

A. Conduct a pre-installation conference at the Project Site before each construction activity that requires coordination with other construction.

B. Attendees: The Installer and representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise the Architect of scheduled meeting dates.

1. Review the progress of other construction activities and preparations for the activity under consideration at each pre-installation conference, including requirements for the following:
   a. Contract Documents.

b. Options.
c. Related Change Orders.
d. Purchases.
e. Deliveries.
f. Shop Drawings, Product Data, and quality-control samples.
g. Review of mockups or finish samples.
h. Possible conflicts.
i. Compatibility problems.
j. Time schedules.
k. Weather limitations.
l. Manufacturer's recommendations.
m. Warranty requirements.
n. Compatibility of materials.
o. Acceptability of substrates.
p. Temporary facilities.
q. Existing Occupancies.
r. Space and access limitations.
s. Governing regulations.
t. Safety.
u. Inspecting and testing requirements.
v. Required performance results.
w. Recording requirements.
x. Protection.

2. The Contractor shall record significant discussions and agreements and disagreements of each conference, and the approved schedule. The Contractor shall promptly distribute the record of the meeting to everyone concerned, including the Owner and the Architect.
3. Do not proceed with the installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene the conference at the earliest feasible date.

1.05 PROGRESS MEETINGS

A. Conduct progress meetings at the Project Site weekly. Notify the Owner and the Architect of scheduled meeting dates. Coordinate dates of meetings with preparation of the payment request. General Contractor to record minutes of all meetings.

B. Attendees: In addition to representatives of the Owner and the Architect, each subcontractor, supplier, or other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.

C. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the status of the Project.

1. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
2. Review the present and future needs of each entity present, including the following:
    a. Interface Requirements.
    b. Time & Project Progress.
    c. Work Hours.
    d. Updated Weekly Look-Ahead Schedule.
    e. Critical Work Sequencing.
    f. Off-Site Fabrication Problems.
    g. Updated Pre-Installation Conference Schedule.
    h. Deliveries.
    i. Use of the Premises.
    j. Security Procedures.
    k. Parking Issues & Snow Removal.
    l. Office, Work, and Storage Areas.
    m. Housekeeping & Cleaning of Construction Areas.
    n. Safety Procedures.
    o. First Aid.
    p. Draft Application for Payment Periodic Submittals Certification Statement (At Appropriately Timed Meeting Each Month).
    q. Updated Submittal, RFI, SI, RFP, COP, CCD, and CO Logs.
    r. New Submittals, RFI's, SI's, RFP's, COP's, CCD's, CO's, etc.
    s. Any Project Coordination Issues or Drawings.
    t. Quality Control, Inspections, and Testing.
    u. Temporary Facilities.
    v. Preparation of Project Closeout Documents.
3. The Contractor shall record and promptly distribute minutes of this meeting to all project members (in attendance or not), including the Architect and Owner, and as additionally directed by the Architect.
    a. Meeting Minutes shall be in a standard type-written format to remain consistent for every project meeting and include, but not limited to, the following items:
        1) Detailed notes from all discussions of project business items in chronological order.
        2) Updated Project Contractor, Subcontractor, Vendor List.
        3) Updated Construction Schedule.
        4) Updated Weekly Look-Ahead Schedule.
        5) Updated Submittal, RFI, SI, RFP, COP, CCD, and CO Logs.

1.06 COORDINATION MEETINGS

A. Conduct coordination meetings with all trades convenient for all parties involved. In addition, conduct coordination meetings when requested by the Architect or Clerk of Works.

1.07 TIME OF PROGRESS AND COORDINATION MEETINGS

A. Conduct both meetings weekly on a day agreeable to all parties, at a designated location at the site, or other agreed upon location.

1.08 PROJECT CLOSEOUT CONFERENCE

A. The Project Close-Out Conference shall be conducted at a time convenient for all parties involved prior to Substantial Completion. Refer to Section 01700 – Project Closeout for additional information for requirements.

PART 2 – PRODUCTS NOT USED

PART 3 – EXECUTION NOT USED

END OF SECTION

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SECTION 01 22 00

UNIT PRICES

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, the following:
   1. Administrative and procedural requirements for inclusion or deletion of certain units of Work into or from the Contract Documents.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
   2. Section 02 41 13 - Selective Demolition
   3. Section 03 54 13 - Cementitious Underlayment
   4. Section 04 20 00 – Unit Masonry
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
   7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
   8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
   9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
   10. DIVISION 09 – FINISHES; including all Sections contained therein.
   11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
   12. Section 14 24 00 – Hydraulic Elevator
   13. Section 21 00 00 – Fire Suppression
   14. Section 22 00 00 – Plumbing
   15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
   16. Section 26 00 00 – Electrical
   17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
   18. Section 28 10 00 – Fire Alarm
   19. Section 31 20 00 - Earth Moving

1.04 UNIT PRICES

A. General Provisions:

1. Unit prices shall be used to determine adjustments to the Contract Sum for changes in work where the actual quantities of Work defined in the Contract Documents are increased or decreased.
2. Base conditions or quantities to be carried are identified in the Specifications. No additional compensation shall be considered for the number of occurrences, locations, timeliness, or scheduling of the excavations or other adjustments.
3. The General Contractor is fully responsible for reviewing the test pit data and borings and becoming familiar with site conditions.
4. Materials, methods of installation and definitions of terms set forth under the various unit price items are indicated in the Schedule of Unit Prices and indicated in the Contract Documents.
5. Performance of work which is not required under the Contract Documents, or which is not authorized by Change Order, whether such work item is set forth hereunder as a Unit Price Item, shall not be considered cause for any extra payment. The General Contractor shall be held fully responsible for such unauthorized work, including the performance of all corrective measures required by the Architect.
6. For all site-related unit price work, quantities for adjustment shall be calculated by a registered Professional Engineer or Surveyor retained by the General Contractor, as agreed to by the Architect. In the case of ledge, boulders, forest mat, and subsoil, the General Contractor's surveyor shall submit profiles of ledge, work sheets, plans and method of calculation shall be submitted to Architect for approval prior to commencement of removal.
7. Unit prices for excavation shall include the cost of sheeting, bracing, pumping, and dewatering, and all other costs in connection therewith, including labor, equipment, setup, and mobilization, and overhead and profit.

B. Methods of Measurement

1. Quantity of site related materials removed from the site and replaced with compacted structural fill and or ordinary fill as recommended within earthwork spec. and or Geotechnical Report, including but not limited to ledge, boulders, and unsuitable fill, shall be measured in place, before and after excavation by use of electronic GPS calculation, to determine the actual cubic yard volume.

C. Schedule of Unit Prices: As authorized by the Owner, should the quantities of certain classes of Work be increased or decreased, as described below, the Unit Prices shall be the basis of payment to the General Contractor, or credit to the Owner, for such increase or decrease in the Work. The Unit Prices shall represent the exact net amount, per unit, to be paid the General Contractor, in the case of additions, and the exact net amount to be refunded to the Owner, in the case of decreases. No additional adjustment shall be allowed for overhead, profit, insurance, or other direct or indirect expenses, over excavation, or other related work, without prior written approval of the Owner. Unit prices to be included within the General Contractor base bid.

Lincoln Elementary School:

Unit Price No. 1: Excavation, stockpiling, and removal of unsuitable soils at the new ADA walkways, sidewalk, and utilities and replace with imported suitable backfill materials that is more than or less than 250 cubic yards specified in accordance with requirements of Section 31 20 00 - Earth Moving.

Unit Price No. 2: Excavation, stockpiling, and removal of unsuitable soils at the building, retaining walls at footings and replace with imported structural infill compacted in place that is more than or less than 100 cubic yards specified in accordance with requirements of Section 31 20 00 - Earth Moving.

Unit Price No. 3: Excavation, stockpiling, and removal of ledge and boulders measured at 2 cubic yards and larger at the new elevator pit and replace with imported structural infill compacted in place that is more than or less than 50 cubic yards specified in accordance with requirements of Section 31 20 00 - Earth Moving.

Thorndyke Road Elementary School:

Unit Price No. 4: Excavation, stockpiling, and removal of unsuitable soils at the existing sloped walkway and replace with imported suitable backfill materials that is more than or less than 100 cubic yards specified in accordance with requirements of Section 31 20 00 - Earth Moving.

Unit Price No. 5: Excavation, stockpiling, and removal of unsuitable soils at the new elevator pit and replace with imported structural infill compacted in place that is more than or less than 100 cubic yards specified in accordance with requirements of Section 31 20 00 - Earth Moving.

PART 2 – PRODUCTS **NOT USED**

PART 3 – EXECUTION **NOT USED**

END OF SECTION

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SECTION 01 25 00

SUBSTITUTION PROCEEDURES

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for handling requests for substitutions made after award of the Contract.

B. References Standards and Definitions: Refer to Section 014200 "Reference" for applicability of industry standards to products specified.

1. Requirements for submitting the Contractor's Construction Schedule and the Submittal Schedule are included under Section 013300 “Submittal Procedures”.
2. Procedural requirements governing the Contractor's selection of products and product options are included under Section 016000 “Product Requirements”.

1.03 DEFINITIONS

A. Definitions used in this Article do not change or modify the meaning of other terms used in the Contract Documents.

B. Substitutions: Changes in products, materials, equipment, and methods of construction required by the Contract Documents proposed by the Contractor after award of the Contract are requests for substitutions. The following are not considered to be requests for substitutions:

1. Specified options of products and construction methods included in the Contract Documents.
2. The Contractor's determination of, and compliance with, governing regulations and orders issued by governing authorities.

1.04 SUBMITTALS

A. Substitution Request Submittal: Requests for substitution will be considered if received within two (2) days after commencement of the Work. Requests received more than two (2) days after commencement of the Work may be considered or rejected at the discretion of the Architect.

1. Submit three (3) copies of each request for substitution for consideration. Submit requests in the form and according to procedures required for Change-Order Proposals.
2. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers.
3. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:

a. Product Data, including Drawings and descriptions of products and fabrication and installation procedures.
b. Samples, where applicable or requested.
c. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
d. Cost information, including a proposal of the net change, if any in the Contract Sum.
e. The Contractor's certification that the proposed substitution conforms to requirements in the Contract Documents in every respect and is appropriate for the applications indicated.

4. Architect's Action: Within five (5) days of receipt of a request for substitution the Architect will request additional information or documentation for evaluation necessary for the evaluation of the request. Within five (5) days of receipt of the request, or of receipt of additional information or documentation, whichever is later, the Architect will notify the Contractor of acceptance or rejection of the substitution. If a decision on use of a proposed substitute cannot be made or obtained within the time allocated, use the product specified by name. Acceptance will be in the form of a Change Order when a change in the Contract Sum or Contract Time is required; or in the form of the Architect's Supplementary Instructions when no change to the Contract Sum or Time is required.

1.05 WORK CONDITIONS / SEQUENCE

A. If sub-contractors find that conditions are not appropriate for them to begin the work of their trade or if they are directed to perform their work out of sequence by the General Contractor or if the General Contractor directs sub-contractors to start and continue regardless of job conditions, the sub-contractor shall so notify the Architect in writing by certified mail immediately.

PART 2 - PRODUCTS

2.01 SUBSTITUTIONS

A. The Contractor's submittal and the Architect's acceptance of Shop Drawings, Product Data, or Samples that relate to construction activities not complying with the Contract Documents do not constitute an acceptable or valid request for substitution, nor do they constitute approval.

B. Conditions: The Architect will receive and consider the Contractor's request for substitution when one or more of the following conditions are satisfied, as determined by the Architect. If the following conditions are not satisfied, the Architect will return the requests without action except to record non-compliance with these requirements.

1. Extensive revisions to the Contract Documents are not required.
2. Proposed changes are in keeping with the general intent of the Contract Documents.
3. The request is timely, fully documented, and properly submitted.
4. The request is directly related to an "or-equal" clause or similar language in the Contract Documents.
5. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.

6. The specified product or method of construction cannot be provided in a manner that is compatible with other materials and where the Contractor certifies that the substitution will overcome the incompatibility.
7. The specified product or method of construction cannot be coordinated with other materials and where the Contractor certifies that the proposed substitution can be coordinated.
8. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provides the required warranty.

PART 3 - EXECUTION NOT USED

END OF SECTION

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SECTION 01 26 00

CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

B. Related Sections: The following sections contain requirements that relate to this Section:
   1. Division 1 Section 012900 “Payment Procedures” for administrative procedures governing applications for payment.
   2. Division 1 Section 013300 “Submittal Procedures” for requirements for the Contractor’s Construction Schedule.
   3. Division 1 Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after award of the Contract.

1.03 MINOR CHANGES IN THE WORK

A. Supplemental instructions authorizing minor changes in the Work, not involving an adjustment to the Contract Sum or Contract Time, will be issued by the Architect on the City's Form of Supplemental Instructions.

1.04 REQUEST FOR PROPOSAL

A. Owner initiated Request for Proposal: Proposed changes in the Work that will require adjustment to the Contract Sum or Contract Time will be issued by the Architect, with a detailed description of the proposed change and supplemental or revised Drawings and Specifications, if necessary.
   1. Proposal requests issued by the Architect are for information only. Do not consider them an instruction either to stop work in progress, or to execute the proposed change.

1.05 PROPOSED CHANGE ORDER

A. Proposed Change Order: Using the form at the end of this section submit your proposal for the adjustment to the Contract Sum or Contract Time in response to a Request for Proposal or for Contractor initiated request for a change with Proposed Change Order.
   1. Unless otherwise indicated in the Request For Proposal, within twenty (20) days of receipt of the proposal request, submit to the Architect for the Owner's review an estimate of cost necessary to execute the proposed change.

a. Include a list of quantities of products to be purchased and unit costs, along with the total number of purchases to be made. Where requested, furnish survey data to substantiate quantities.
   1) Indicate delivery charges, equipment rental, and amounts of trade discounts.
   2) Include a statement indicating the effect the proposed change in the Work will have on the Contract Time.

B. Contractor initiated request for change with Proposed Change Order: When latent or other unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Architect.
   1. Include a statement outlining the reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and Contract Time.
      a. Include a list of quantities of products to be purchased and unit costs along with the total number of purchases to be made. Where requested, furnish survey data to substantiate quantities.
      b. Indicate delivery charges, equipment rental, and amounts of trade discounts.
      c. Comply with requirements in Section 01631 "Product Substitutions" if the proposed change in the Work requires the substitution of one product or system for a product or system specified.

1.06 ALLOWANCES

A. Allowance Adjustment: Base each Change Order Proposal Request for an allowance cost adjustment solely on the difference between the actual purchase amount and the allowance, multiplied by the final measurement of work-in-place, with reasonable allowances, where applicable, for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
   1. Include installation costs in the purchase amount only where indicated as part of the allowance.
   2. When requested, prepare explanations and documentation to substantiate the margins claimed.
   3. The Owner reserves the right to establish the actual quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs because of a change in scope described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit, within twenty (20) days of receipt of the Change Order or Construction Change Directive authorizing work to proceed. Claims submitted later than twenty (20) days will be rejected.
   1. The Change Order cost amount shall not include the Contractor's indirect expense except when it is clearly demonstrated that either the nature or scope of work required was changed from that which could have been foreseen from information in Contract Documents.
   2. No change to the Contractor's indirect expense is permitted for selection of higher or lower priced materials or systems of the same scope and nature as originally indicated.

1.07 CONSTRUCTION CHANGE DIRECTIVE

A. A Construction Change Directive shall be issued for all work involving a change in contract cost or time. The Construction Change Directive instructs the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. The Construction Change Directive will contain a complete description of the change in the Work and designate the method to be followed to determine change in the Contract Sum or Contract Time or is for a lump sum amount approved by the Architect.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive, if so, directed by the Architect.

1. After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.08 CHANGE ORDER PROCEDURES

A. Upon the Owner's approval of a Change Order Proposal Request, the Architect will issue a Change Order for signatures of the Owner and Contractor.

1.09 OVERHEAD AND PROFIT

A. Overhead and Profit will be as noted elsewhere in these specifications.

1. Labor rates shall not exceed those shown in the contract specifications as set forth by the Department of Labor and Industries.

B. In reviewing Change Orders, the Architect will exercise his right to request a complete breakdown from the contractor showing exact costs for labor and material, as well as delivery slips and invoices from suppliers and other subcontractors.

PART 2 – PRODUCTS NOT USED

PART 3 – EXECUTION NOT USED

END OF SECTION

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SECTION 01 29 00

PAYMENT PROCEDURES

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section

1.02 SUMMARY

A. This Section specifies administrative and procedural requirements governing the Progress Schedule, Schedule of Values, and Contractor's Applications for Payment.
   1. Coordinate the Schedule of Values and Applications for Payment with the Contractor's Construction Schedule, List of Subcontracts, and Submittal Schedule.

B. The Contractor's Construction Schedule and Submittal Schedule are included in Section 013300 "Submittals".

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
   2. Section 02 41 13 - Selective Demolition
   3. Section 03 54 13 - Cementitious Underlayment
   4. Section 04 20 00 – Unit Masonry
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
   7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
   8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
   9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
   10. DIVISION 09 – FINISHES; including all Sections contained therein.
   11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
   12. Section 14 24 00 – Hydraulic Elevator
   13. Section 21 00 00 – Fire Suppression
   14. Section 22 00 00 – Plumbing
   15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
   16. Section 26 00 00 – Electrical
   17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
   18. Section 28 10 00 – Fire Alarm
   19. Section 31 20 00 – Earth Moving

1.04 PROGRESS SCHEDULE

A. Prepare the Progress Schedule in accordance with Article 8, Paragraphs 8.2.3 and 8.2.4 of the General Conditions for approval by the Architect.

1. The Progress Schedule shall conform to the requirements in Section 013300, paragraph 1.4, Contractor’s Progress Schedule, and the sample bound in the aforementioned paragraph.

1.05 SCHEDULE OF VALUES

A. Coordinate preparation of the Schedule of Values with preparation of the Progress Schedule.

1. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:
    a. Contractor's Progress Schedule.
    b. Application for Payment forms.
    c. List of products.
    d. Schedule of allowances, if any.
    e. Schedule of alternates, if any.
    f. Schedule of unit prices, if any.
    g. List of products.
    h. List of principal suppliers and fabricators.
    i. Schedule of submittals.
2. Submit the Schedule of Values to the Architect as soon as possible, but no later than seven (7) days before the date scheduled for submittal of the initial Application for Payment.

B. Format and Content: Use the Project Manual Table of Contents as a guide to establish the format for the Schedule of Values. Provide at least one (1) line item for each Specification Section. Coordinate with the Architect for exact breakdown of major categories of work including, but not limited to major equipment and project closeout submittals.

1. Include the following Project identification on the Schedule of Values:
    a. Project name and location.
    b. Name of the Architect.
    c. Project number.
    d. Contractor's name and address.
    e. Date of submittal.
2. Arrange the Schedule of Values in a tabular form with separate columns to indicate the following for each item listed:
    a. Generic name.
    b. Related Specification Section.
    c. Description of Work.
    d. Name of subcontractor.
    e. Name of manufacturer or fabricator.
    f. Name of supplier.
    g. Change Orders (numbers) that have affected value.
    h. Dollar value to nearest dollar.
    i. Percentage of Contract Sum to the nearest percent, adjusted to total 100 percent.

3. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Breakdown shall be done by sequence. Coordinate with the Project Manual Table of Contents. Break principal subcontract amounts down into several line items, including but not limited to major equipment and project closeout submittals.
4. Do not round amount off to the nearest whole dollar; carry all amounts out to the two (2) decimal places and the totals shall equal the Contract Sum.
5. For each part of the Work where an Application for Payment may include materials or equipment, purchased, or fabricated and stored, but not yet installed, provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
6. Margins of Cost: Show line items for indirect costs, and margins on actual costs, only to the extent that such items will be listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete, including its total cost and proportionate share of general overhead and profit margin for each item.
    a. Temporary facilities, project closeout submittals, and other major cost items that are not direct cost of actual work-in-place shall be shown as separate line items in the Schedule of Values or distributed as general overhead expense, at the Contractor's option.
7. Schedule Updating: Update and resubmit the Schedule of Values prior to the next Application for Payment when Change Orders or Construction Change Directives result in a change to the Contract Sum.

1.06 APPLICATIONS FOR PAYMENT

A. Draft Application Preparation: Submit three (3) **draft** copies of the (current) Application for Payment at the weekly project meeting for Architect's review seven (7) days in advance of the "Payment Application Time" as indicated in the Agreement.
    1. Draft Application for Payment transmittal shall include a fully executed Draft Cover Sheet or **Periodic Submittal Certification Statement** on Contractor letterhead (bound at the end of this section hereafter) certifying that the following Periodic Submittals are current for the appropriate period:
        a. Originals of All Waivers of Mechanics Lien & Corresponding Logs Covering Status of All Waivers
        b. Certified payrolls
        c. Contract Compliance Submittals
        d. Insurance and transfer title certificates for any material stored off site
        e. Updated as-built drawings of record reflecting Work for the current Application period

B. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect and paid for by the Owner.
    1. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.

C. Payment Application Times: Each progress payment date is as indicated in the Agreement. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.

D. Payment Application Cover Sheet Form: Complete the enclosed **Application and Certification for Payment Cover Sheet** on Contractor letterhead (bound at the end of this Section hereafter) and transmit with each Payment Application Form submittal.

E. Payment Application Forms: Use AIA Document G 702 and Continuation Sheets G 703 as the form for Application for Payment. **No exceptions will be made.**

F. Application Preparation: Complete every entry on the form, including notarization and execution by a person authorized to sign legal documents on behalf of the Contractor. The Architect will return incomplete applications without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions have been made.
2. Include only amounts of approved and fully executed Change Orders. Obtain approval from the Architect prior to inclusion into the Application.
3. Each Application for Payment **must** be accompanied by an updated Progress Schedule. The format to which is subject to the Architect's approval.

G. Payment for materials and/or equipment stored off site shall be considered upon the Owner's approved submission by the Contractor bill(s) of sale or such other documentation or procedures satisfactory to the Owner to establish the Owner's clear and legal title to such materials and/or equipment or otherwise provided to protect the Owner's interest. This shall include applicable insurance and transportation to the project site for those materials and/or equipment suitably stored off site under consideration for payment.

1. Any Contractor making an application for payment pursuant to Section 00200 – General Conditions, paragraph 9.3.2, shall provide the following written documentation to the Architect through the General Contractor as delineated below and as otherwise maybe reasonably requested by the Owner:
   a. Bill of Material, Purchase Order, or Invoice Number.
   b. Product Description Listing.
   c. Serial Numbers (If Applicable)
   d. Materials and/or Equipment (wares) shall be segregated from all other stock or equipment and clearly labeled and/or marked as City of Worcester Property.
   e. Wares shall be always available for inspection and in any event within twenty-four (24) hours after receiving prior notice from the Owner/Architect.
   f. Provide written directions from the project site to the location of the stored wares.
   g. Name of contact person at the storage site and applicable telephone numbers.
   h. Method and mode of transportation from off-site storage location to the job site.

H. Retainage: In accordance with the Supplemental General Conditions, the Awarding Authority (Owner) shall deduct a retainage not exceeding five (5) percent of the approved amount of the periodic payment. The aforesaid five (5) percent retainage deduction by the Owner is the only retainage authorized hereunder. The contractor shall not deduct any amounts from payments received on behalf of subcontractors, except those deductions specifically authorized by M.G.L. Chapter 30, Section 39(1)(a).

1. Upon the initial and any subsequent Application for Payment; requesting or reflecting a "Release of Retainage" provide a Summary cover sheet indicating the derivation arithmetically, by each line item, of the total released to date and the of the current total retainage sum.

I. Transmittal: Upon receipt of the required periodic submittals enumerated above and upon approval of the "Draft Application", submit six (6) fully executed and notarized original copies with Cover Sheet of the current Application for Payment to the Architect by means ensuring receipt within twenty-four (24) hours. One (1) copy shall be complete, including waivers of lien and similar attachments.

1. Transmit each copy with a transmittal form listing attachments, and recording appropriate information related to the application in a manner acceptable to the Architect.
2. With each requisition, after the first requisition, submit one (1) copy of up-dated as-built drawings for all underground and concealed work, showing locations, depths, or elevations.

J. Waivers of Mechanics Lien: With each Application for Payment, submit waivers of mechanics lien from every entity who may lawfully be entitled to file a mechanics lien arising out of the Contract, and related to the Work covered by the payment.

1. Submit partial waivers on each item for the amount requested, prior to deduction for retainage, on each item.
2. When an application shows completion of an item, submit final or full waivers.
3. The Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Waiver Delays: Submit each Application for Payment with the Contractor's waiver of mechanics lien for the period of construction covered by the previously paid application.
    a. Submit final Application for Payment with, or preceded by, final waivers from every entity involved with performance of Work covered by the application that could lawfully be entitled to a lien.
5. Waiver Forms: Submit waivers of lien on forms, and executed in a manner, acceptable to Owner.

K. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following:

1. List of subcontractors; at all tiers.
2. List of principal suppliers and fabricators.
3. Approved Schedule of Values.
4. Approved Contractor's Progress Schedule see Section 01300, Paragraph 1.4.
5. Contractor's Construction Schedule (preliminary if not final).
6. Schedule of principal products.
7. Submittal Schedule (preliminary, if not final).
8. List of Contractor's staff assignments.
9. List of Contractor's principal consultants.
10. Copies of building permits.
11. Copies of authorizations, permits and licenses from governing authorities for performance of the Work.
12. Initial progress report.
13. Report of pre-construction meeting.

14. Schedule of Pre-installation meetings.
15. Certificates of insurance and insurance policies.
16. Performance and payment bonds.
17. Data needed to acquire Owner's insurance.
18. Initial settlement survey and damage report, if required.
19. List of Contractor's personnel names and titles assigned on the project and emergency telephone numbers.

L. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit Application for Payment.

1. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
2. Administrative actions and Submittals that shall precede or coincide with this application include:
    a. Occupancy permits and similar approvals.
    b. Warranties (guarantees) and maintenance agreements.
    c. Test/adjust/balance records.
    d. Maintenance instructions.
    e. Meter readings.
    f. Start-up performance reports.
    g. Changeover information related to Owner's occupancy, use, operation and maintenance.
    h. Final cleaning.
    i. Application for reduction of retainage, and consent of surety
    j. Advice on shifting insurance coverage.
    k. Final progress photographs.
    l. List of incomplete work, recognized as exceptions to Architect's Certificate of Substantial Completion.

M. Final Payment Application: Administrative actions and submittals that must precede or coincide with submittal of the final payment Application for Payment include the following:

1. Completion of Project closeout requirements.
2. Completion of items specified for completion after Substantial Completion
3. Assurance that unsettled claims will be settled.
4. Assurance that incomplete Work and Work not accepted will be completed without undue delay.
5. Transmittal of required Project construction records to the Owner.
6. Certified property survey.
7. Proof that taxes, fees and similar obligations have been paid.
8. Removal of temporary facilities and services.
9. Removal of surplus materials, rubbish and similar elements.
10. Change of door locks to Owner's access.
11. Order of Conditions Certificate of Compliance, if applicable.

PART 2 – PRODUCTS NOT USED

PART 3 – EXECUTION NOT USED

END OF SECTION

CONTRACTOR LETTER HEAD

APPLICATION AND CERTIFICATION FOR PAYMENT COVER SHEET

PROJECT:_____ APPLICATION NO: _____

For
Period
Ending: _____ AMOUNT CERTIFIED: $_____

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief, the Work covered by this Application for Payment has been completed in accordance with the Contract Documents; and the current Payment shown herein is now due.

The Contractor further certifies that the entire amount of all previous Payments received for labor performed and materials furnished have been promptly paid to all Subcontractors whose work was certified for payment on previous applications, less, where applicable, only an amount specified in any court proceeding barring such payment and/or an amount claimed due from the Subcontractor by the Contractor as expressly authorized by M.G. L. Chapter 30, Section 39F (1) (a). No other amounts have been deducted or retained from such payments by the contractor.

Contractor: _____ **STATE OF:** _____

Signed by: _____ **COUNTY OF:** _____

Date: _____ Subscribed and sworn to before me on this _____ Day of _____ 20__.

Notary public: _____
My Commission Expires: _____

APPROVED FOR PAYMENT:

Signed:_____ Signed:_____
By: James Bedard, Facilities Director By: Robert Sherman., Architect

Date:_____ Date:_____

Signed:_____ Signed:_____
By: By:

Date:_____ Date:_____

CONTRACTOR LETTER HEAD

DRAFT APPLICATION FOR PAYMENT
PERIODIC SUBMITTAL CERTIFICATION STATEMENT

Project Name: Draft Application Date: _____

Draft Application No._____ (Requisition No.)

For Period:
Starting _____
Through Period
Ending _____

_____(Name of Contractor) _____ ,
certifies that the "Draft Application for Payment" as herein submitted with all of the following Periodic Submittals fully and completely executed and current for the appropriate time period(s) as required.
FURNISH THE FOLLOWING PERIODIC SUBMITTALS AND PROVIDE ALL REQUIRED INFORMATION FOR THE APPROPRIATE TIME PERIOD(S) AS REQUESTED. PLEASE SUBMIT ON **SEPARATE** SHEETS:

I. **Original Waivers of Mechanic Lien:** List every entity who may be lawfully entitled to file a lien resulting out of this Contract, including but not limited to; contractors/subcontractors, at all tiers, vendors, and suppliers. Submit current originals of all Waivers covering all WORK completed through the period ending thirty (30) days prior to this periods "Application" date and as further required in I above.

II. **Certified Payrolls:** All payroll reports have been submitted as required by the Contract Compliance Office.

III. **Contract Compliance Reports:** All contract compliance reports have been submitted as required by the Contract Compliance Office.

IV. **Insurance & Title Transfer Certificates** for material stored off site, if applicable.

V. **Updated As-Built Drawings:** Record drawings have been submitted reflecting the work completed up to the time of Application.

This Draft Application for Payment Certification Statement and corresponding Periodic Submittals (attached) shall be reviewed by the Awarding Authority for completeness. Any deficiency, discrepancies or missing items shall cause this Draft Application for Payment to be returned to the Contractor with no action taken.

I, _____ hereby certify, that the Periodic
(Name of contractor)

Submittals indicated herein have been reviewed by the undersigned and are complete and current as required under provisions of this Contract.

_____
_____
(Name of Authorized Person) (Date)

_____
(Title)

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SECTION 013100

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section

1.02 SUMMARY

A. This Section specifies administrative and supervisory requirements necessary for project coordination including, but not limited to the following:
   1. Coordination and cutting, drilling, and patching.
   2. General installation provisions.
   3. Administrative and supervisory personnel.
   4. Cleaning and protection.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Project meetings, coordination meetings, and pre-installation conferences are included in Section “Project Meetings.”
   2. Requirements for preparing and submitting the Contractor's Construction Schedule are included in Section “Submittals.”

1.03 COORDINATION

A. Coordinate construction operations included in various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections of the specifications that depend on each other for proper installation, connection, and operation.
   1. Where installation of one part of the Work depends on installation of other components, either before or after its own installation, schedule construction operations in the sequence required to obtain the best results.
   2. Where availability of space is limited coordinate installation of different components to assure maximum accessibility for required maintenance, service, and repair.
   3. Make provisions to accommodate items scheduled for later installation.
   4. The General Contractor shall as part of his work provide for all cutting, patching, and drilling, not specified to be the work of others.

B. Where necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.
   1. Prepare similar memoranda for the Owner and separate contractors where coordination of their work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of schedules.
2. Installation and removal of temporary facilities.
3. Delivery and processing of submittals.
4. Progress meetings.
5. Project closeout activities.

D. Conservation: Coordinate construction operations to assure that operations are carried out with consideration given to conservation of energy, water, and materials.

1.04 SUBMITTALS

A. Coordination Drawings: Prepare coordination Drawings where careful coordination is needed for installation of products and materials fabricated by separate entities. Prepare coordination drawings where limited space availability necessitates maximum utilization of space for efficient installation of different components.

1. Show the relationship of components shown on separate Shop Drawings.
2. Indicate required installation sequences.
3. Comply with requirements contained in Section 01300 – Submittals.
4. Format to be as directed by the Architect.

B. Staff Names: Within fifteen (15) days of commencement of construction operations, submit a list of the Contractor's principal staff assignments, including the superintendent and other personnel in attendance at the Project Site. Identify individuals and their duties and responsibilities. List their addresses and telephone numbers. Provide twenty-four (24) hour Emergency telephone numbers listed separately.

1. Post copies of the list in the Project meeting room, the temporary field office, and each temporary telephone.
2. The Contractor shall provide a copy of the list, and updates as its changes, to the Worcester Police Department and other City Departments as directed by the Architect.

PART 2 – PRODUCTS NOT USED

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION PROVISIONS

A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.

B. Manufacturer’s Instructions: Comply with manufacturer’s written instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than the requirements contained in Contract Documents.

C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.

D. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.

E. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.

F. Re-check measurements and dimensions, before starting each installation.

G. Install each component during weather conditions that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.

H. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.

I. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decision to the Architect for final decision.

3.02 CLEANING AND PROTECTION

A. During handling and installation clean and protect construction in progress and adjoining materials in place. Apply protective covering where required and as necessary to assure protection from damage or deterioration.

B. Clean and maintain all completed construction as frequently as necessary through the remainder of the construction period.

C. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in-progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:

1. Excessive vibration.
2. Excessive static or dynamic loading.
3. Excessive internal or external pressures.
4. Excessively high or low temperatures.
5. Thermal shock.
6. Excessively high or low humidity.
7. Air contamination or pollution.
8. Air borne debris/dust or construction particulates.
9. Water or ice.
10. Solvents.
11. Chemicals.
12. Light.
13. Puncture.
14. Abrasion.
15. Heavy traffic.
16. Soiling, staining, and corrosion.
17. Bacteria.

18. Rodent and insect infestation.
19. Combustion.
20. Electrical current.
21. High-speed operation.
22. Improper lubrication.
23. Unusual wear or other misuse.
24. Contact between incompatible materials.
25. Destructive testing.
26. Misalignment.
27. Excessive weathering.
28. Unprotected storage.
29. Improper shipping or handling.
30. Theft.
31. Vandalism.

END OF SECTION

SECTION 013300

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1. The submittals enumerated below shall require review and/or approval by the Architect.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for submittals required for performance of the Work, including:

1. Contractor's Progress Schedule.
2. Major delivery schedule.
3. Existing utility tie-in's schedule.
4. Submittal schedule.
5. Pre-Installation Conference Schedule (By Specification Section).
6. Daily construction reports.
7. Shop drawings.
8. Product data.
9. Samples.
10. Coordination Drawings.
11. Quality assurance submittals.
12. Submittal of three (3) sets of plans and specifications, complete with all addendums posted to the City of Worcester Building Department to obtain a building permit.

B. Administrative Submittals: Refer to other Division 1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to, the following:

1. Product Substitution.
2. Periodic Submittals.
3. Permits.
4. Applications for Payment.
5. Performance and payment bonds.
6. Insurance Certificates.
7. List of Project Contractors, Subcontractors, Vendors, etc.
8. List of Personnel and Emergency Telephone Numbers.
9. City Ordinance Program Forms.

C. The Schedule of Values submittal is included in Section 01027 "Applications for Payment".

D. "Project Closeout", Section 01700, specifies requirements for submittal of Project Record Documents and warranties at project closeout.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
2. Section 02 41 13 - Selective Demolition
3. Section 03 54 13 - Cementitious Underlayment
4. Section 04 20 00 – Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.04 SUBMITTAL PROCEDURES/SHOP DRAWINGS

A. Submittal procedures shall be electronic for all submittals for approval and distribution unless otherwise noted. Provide the owner with one copy of all approved submittals in an organized manner with a submittal log. All color samples must be distributed as hard copies, and electronically filed to track. Electronic files shall be clean, clear, and readable. Plan files to be PDF and/or AutoCAD and be to scale as appropriate. Contractor to transmit and update each submittal and process electronically, maintain a log that is distributed and updated weekly. All e-mails to clearly identify the submittal number and shall include the log, Or the contactor to maintain a web-based system used for submittals, and the construction process.

B. Distribution: Distribution of submittals shall be distributed as follows unless otherwise noted:

1. Architect.
2. Clerk of Works.
3. Owner – electronic and paper copy.
4. A minimum of Three (3) copies for the Contractor as necessary for distribution to subcontractors, suppliers, installers, manufacturers, fabricators, and any other applicable parties.

C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

D. Processing: All Contractors are directed to the timeliness and critical importance of expediting the submittal process. Any lead times, which may impact sequencing, should be prioritized to meet the project schedule. Architects must be notified if any delays arise that will impact on lead times.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
   2. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.
   3. To avoid the need to delay installation because of the time required to process submittals and to allow sufficient time for submittal review, all contractors' submittals shall be submitted for processing and have received final Architect's approval within 45 days from the date of Contract.
      a. Allow ample time for initial review to achieve efficient construction sequencing. Allow additional time if the Architect must delay processing to permit coordination with subsequent submittals.
      b. If an intermediate submittal is necessary, process the same as the initial submittal.
      c. Allow ample time for reprocessing each submittal to achieve efficient construction sequencing.
      d. No extension of Contract Time will be authorized because of the contractor's failure to transmit submittals to the Architect for processing sufficiently in advance of the scheduled Work.

E. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
   1. Provide a space approximately 4 by 5 inches on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.
   2. Include the following information on the label for processing and recording action taken.
      a. Project name.
      b. Date.
      c. Name and address of the Architect.
      d. Name and address of the Contractor.
      e. Name and address of the subcontractor.
      f. Name and address of the supplier.
      g. Name of the manufacturer.
      h. Number and title of appropriate Specification Section.
      i. Drawing number and detail references, as appropriate.

F. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from the Contractor to the Architect using a transmittal form. The Architect will not accept submittals received from sources other than the Contractor.

G. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

1.05 CONTRACTOR'S PROGRESS SCHEDULE

A. Bar (Gantt) Chart Schedule: Meeting the requirements of Section 00200 Paragraphs 4.10, 4.10.1, 8.2.3 through 8.2.9. Prepare a fully developed, horizontal bar type of chart titled: “Progress Schedule”. A sample is attached at the end of this section, some requirements specified here are not shown in the sample.

B. Time, the horizontal (x) axis in this schedule shall show the start of on site work through the Date of Substantial Completion, show the time for completion of punch list items, and show the time for general warranty and completion of commissioning.

C. Provide a separate time bar for each line in the approved “Schedule of Values” with the incremental value of work in place for each month. Work Completed (in place) must be 99% of contract value to achieve Substantial Completion. Provide a continuous vertical line to identify the first working day of each month.

D. At the bottom of the progress schedule provide:
   1. a first line showing the total value of the work planned to be completed (in place) for each month,
   2. a second line showing the cumulative total value of the work planned to be completed (in place) to date,
   3. a third line showing the actual total value of the work certified as completed (in place) on the Application and Certificate for Payment for the month, and
   4. a fourth line showing the actual total cumulative value of the work certified as completed (in place) on the Application and Certificate for payment to date.
   5. Refer to Division 1 Section 01027 "Applications for Payment" for cost reporting and payment procedures.

E. Distribution: Following approval of the initial submittal, print and distribute copies to the Architect, Owner, subcontractors, and other parties required to provide actual work in place and conform to schedule.

F. Revisions: Revisions to values and or time shown in the Progress Schedule may only be made to reflect a Change Order and in accordance with Section 00200 Paragraph 8.2.7. When revisions are made, distribute to the same parties and post at the jobsite. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

G. Progress Schedule Updating: Revise the schedule after each meeting, where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

Progress Schedule (as required by Article 8, Paragraphs 8.2.3 & 8.2.4 of the General Conditions)

(Project Name)	(Architect)	(Date)	(Approved by Architect)
(City of Worcester Dept. or Facility)	(Construction Manager)	(Revision Date)	
(Project Address)	(Contractor)	(Revised Through)	

Section Number	Section or Filed Sub-bid Section	Mar-98	Apr-98	May-98	Jun-98	Jul-98	Oct-98	Nov-98	Dec-98	
		1	2	3	4	5	6	7	8	Totals
01000	General Requirements	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$32,000
02000	Sitework	$10,000	$10,000						$10,000	$30,000
03000	Concrete		$4,000	$12,000			$8,000			$24,000
04000	Masonry			$8,000	$10,000	$12,000				$30,000
05000	Metals			$20,000						$20,000
05500	Metal Fabrications							$7,000		$7,000
06000	Wood & Plastics								$4,000	$4,000
07100	Waterproofing & Caulking				$3,000					$3,000
07600	Roofing & Flashing					$12,000				$12,000
08000	Doors & Windows						$4,000			$4,000
08520	Alum. Windows							$8,000		$8,000
08800	Glass & Glazing								$1,000	$1,000
09250	Gypsum Drywall						$6,000	$5,000		$11,000
09310	Ceramic Tile							$2,000		$2,000
09511	Accoustical Ceilings							$1,000	$1,000	$2,000
09650	Resilient Flooring								$3,000	$3,000
09900	Painting								$2,000	$2,000
10000	Specialties								$14,000	$14,000
14204	Hydraulic Elevators						$8,000	$8,000	$8,000	$24,000
15400	Plumbing			$1,000	$2,000			$3,000	$5,000	$11,000
15600	HVAC					$4,000	$5,000		$4,000	$13,000
16000	Electrical			$1,000	$3,000			$4,000	$4,000	$12,000
	Total Planned to be Completed This Month	$14,000	$18,000	$46,000	$22,000	$32,000	$35,000	$42,000	$60,000	
	Total planned to be Completed To Date	$14,000	$32,000	$78,000	$100,000	$132,000	$167,000	$209,000	$269,000	$269,000
	Actual Total Completed This Month	$11,000	$22,000	$38,000						
	Actual Total Completed To Date	$11,000	$33,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$470,000

1.06 SUBMITTAL SCHEDULE

A. After development and acceptance of the Contractor's Progress Schedule, prepare a complete Submittal Schedule and promptly submit the schedule to the Architect.

B. Distribution: Following response to the initial submittal, print and distribute copies to the Architect, Owner, subcontractors, and other parties required to comply with submittal dates.

C. Submittal Schedule Updating: Revise the Submittal Schedule after each meeting or activity where revisions have been recognized or made. Issue the updated project schedule concurrently with each Application for Payment.

1.07 DAILY CONSTRUCTION REPORTS

A. Prepare a daily construction report recording the following information concerning events at the site, and submit copies to the Architect and Clerk of Works at weekly intervals:
   1. List of subcontractors at the site.
   2. Count of personnel at the site.
   3. Accidents and unusual events.
   4. Meetings and significant decisions.
   5. Stoppages, delays, shortages, and losses.
   6. Emergency procedures.
   7. Services connected, disconnected.
   8. Equipment or system tests and startups.
   9. General daily work tasks and progress.

1.08 SHOP DRAWINGS

A. The Contractor's submittal and the Architect's acceptance of Shop Drawings, Product Data, or Samples that relate to construction activities not complying with the Contract Documents do not constitute an acceptable or valid request for substitution, nor do they constitute approval.

B. Submit newly prepared information drawn accurately to scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing.

C. Shop Drawings include fabrication and installation Drawings, setting diagrams, schedules, patterns, templates, and similar Drawings. Include the following information:
   1. Dimensions.
   2. Identification of products and materials included by sheet and detail number.
   3. Compliance with specified standards.
   4. Notation of coordination requirements.
   5. Notation of dimensions established by field measurement.

1.09 PRODUCT DATA

A. The Contractor's submittal and the Architect's acceptance of Shop Drawings, Product Data, or Samples that relate to construction activities not complying with the Contract Documents do not constitute an acceptable or valid request for substitution, nor do they constitute approval.

B. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information, such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, and performance curves.
   1. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as “Shop Drawings”.
   2. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products that are not required, mark copies to indicate the applicable information. Include the following information:
      a. Manufacturer's printed recommendations.

b. Compliance with trade association standards.
c. Compliance with recognized testing agency standards.
d. Application of testing agency labels and seals.
e. Notation of dimensions verified by field measurement.
f. Notation of coordination requirements.

C. Do not submit Product Data until compliance with the requirements of the Contract Documents has been confirmed.

D. Unless non-compliance with Contract Document provisions is observed, the submittal may serve as the final submittal.

E. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.

1. Do not proceed with installation until a copy of Product Data is in the Installer's possession.
2. Do not permit use of unmarked copies of Product Data in connection with construction.

1.10 SAMPLES

A. The Contractor's submittal and the Architect's acceptance of Shop Drawings, Product Data, or Samples that relate to construction activities not complying with the Contract Documents do not constitute an acceptable or valid request for substitution, nor do they constitute approval.

B. Mount or display samples in the manner to facilitate review of qualities indicated. Prepare samples to match the Architect's sample. Include the following:

1. Specification Section number and reference.
2. Generic description of the sample.
3. Sample source.
4. Product name or name of the manufacturer.
5. Compliance with recognized standards.
6. Availability and delivery time.

C. Submit samples for review of size, kind, color, pattern, and texture. Submit samples for a final check of these characteristics with other elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

D. Preliminary Submittals: Submit a full set of choices where samples are submitted for selection of color, pattern, texture, or similar characteristics from a range of standard choices.

1. Preliminary submittals will be reviewed and returned with the Architect's mark, indicating selection and other action.

E. Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation, and similar characteristics, submit three (3) sets. One (1) set will be returned marked with the action taken.

1. Maintain sets of samples, as returned, at the Project Site, for quality comparisons throughout the course of construction.

F. Unless non-compliance with Contract Document provisions is observed, the submittal may serve as the final submittal.

1. Sample sets may be used to obtain final acceptance of the construction associated with each set.

1.11 QUALITY ASSURANCE SUBMITTALS

A. Submit quality-control submittals, including design data, certifications, manufacturer's instructions, manufacturer's field reports, and other quality-control submittals as required under other Sections of the Specifications.

B. Certifications: Where other Sections of the Specifications require certification that a product, material, or installation complies with specified requirements; submit a notarized certification from the manufacturer certifying compliance with specified requirements.

1. Signature: Certification shall be signed by an officer of the manufacturer or other individual authorized to sign documents on behalf of the company.

1.12 ARCHITECT'S ACTION

A. Except for submittals of record or information, where action and return is required or requested, the Architect will review each submittal, mark to indicate action taken, and return as noted in Paragraph 1.3A.

B. Compliance with specified characteristics is the Contractor's responsibility.

C. Action Stamp: The Architect will stamp each submittal with a uniform, self-explanatory action stamp. The Architect will mark the stamp appropriately to indicate the action taken:

D. Final Unrestricted Release: When submittals are marked "Approved", the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend on that compliance.

1. Final-But-Restricted Release: When submittals are marked "Approved as Noted", that Work covered by the submittal may proceed provided it complies with markings or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.

2. Returned for Resubmittal: When submittal is marked “Approved as Noted - Revise and Resubmit” or “Not Approved, Revise and Resubmit", do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the markings and resubmit without delay. Repeat if necessary to obtain different action mark.

E. The Contractor shall not use or permit to be used submittals marked “Approved as Noted - Revise and Resubmit” or "Not Approved, Revise and Resubmit" at the Project Site or elsewhere where Work is in progress.

F. Other Action: Where a submittal is primarily for information or record purposes, special processing or other activity, the submittal will be returned marked "Action Not Required".

1.13 DRAWINGS TO BUILDING DEPARTMENT

A. The Contractor shall submit three (3) sets of fully addendumized plans and specifications to the City of Worcester Building Department upon application for the building permit.

1. Submit drawings to architect prior to permit application for "wet stamping" of architect and engineers professional seal to the drawings. Allow up to three (3) days for this process.
2. Any reduction in addenda plan must be legible.

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION NOT USED

END OF SECTION

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SECTION 01 35 43

HAZARDOUS MATERIALS PROCEDURES

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which effect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 - GENERAL REQUIREMENTS; including all Sections contained therein.
2. DIVISION 02 - EXISTING CONDITIONS; including all Sections contained therein.
3. DIVISION 31 - EARTHWORK; including all Sections contained therein.

1.03 HAZARDOUS MATERIALS PROCEDURES

A. Asbestos:

1. Asbestos Materials Exist On-Site: There are accessible and inaccessible asbestos containing materials (ACM). ACM affected by this project are included under this contract. Hidden ACM may only be found. Refer to items 2 and 3 below.
2. The General Contractor shall retain the services of a licensed Asbestos/Demolition Contractor "Demolition Contractor" to perform the work.
3. Unknown and inaccessible ACM: It is possible that previously unknown ACM may be discovered in currently concealed locations.
4. Notification: If the Demolition Contractor discover or encounter any ACM during the performance of the work, the General Contractor shall immediately:
   a. Stop work, notify the Owner and OPM about the presence of suspect ACM and request instructions for proper action, and
   b. Take whatever steps and measures are necessary to reduce, control or eliminate the risk of exposure of workers and the public to the ACM.
5. Responsible Person On-Site: The General Contractor shall designate one of its senior on-site employees to oversee coordination between the Architect and all subcontractors with respect to hazardous materials issues.

6. Responsibility for Hazardous Material Discovery: It is the sole responsibility of the Demolition Contractor to undertake whatever measures, methods of procedures are necessary, required or otherwise appropriate to safeguard the health and safety of all workers and members of the public with respect to identification and discovery of previously unknown hazardous materials during the work of the Project.
7. Indemnification: To the fullest extent permitted by law, the General Contractor shall indemnify and hold harmless the Owner and the Architect and their agents and employees from and against all claims, damages, losses and expenses including, but not limited to, attorneys' fees arising out of or relating to the performance of the Work, including the discovery or identification of any hazardous materials, provided that any such claim, damage, loss or expense if attributable to bodily injury, sickness, disease or death, or to damage to or destruction of tangible property (other than the Work itself) including the loss of use resulting therefrom; and is caused in whole or in part by any negligent act or omission of the General Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable regardless of whether or not it is caused in part by a party indemnified hereunder.

B. Lead:

1. The Demolition Contractor shall be made aware that Lead Based Paint exists on painted surfaces throughout the building. No testing was performed.
2. It is the Demolition Contractor responsibility to either test painted surfaces or assume that all existing painted surfaces are coated with Lead Paint. All costs for testing shall be the responsibility of the Demolition Contractor at no additional cost to the Owner.
3. All the work of this Contract shall conform to the standard set by all applicable Federal, State and Local laws, regulations, ordinance, and guidelines in such from in which they exist at the time of the work on the Contract and as may be required by subsequent regulations.
4. The Demolition Contractor are solely responsible for means and methods, and techniques used for Demolition Contractor and/or the Demolition and lead control. The Demolition Contractor shall collect, and control lead contaminated debris and to properly remove and dispose of lead contaminated soil around the building due to Demolition Contractor's and/or the Demolition Contractor's activities.
5. The Demolition Contractor shall at his own cost and expense comply with all laws, ordinance, rules, and regulations of Federal, State, Regional and Local authorities during Demolition, prepping, sanding, cutting, burning, scraping, painting over, grinding and regarding handling, storing, and disposing of lead and lead contaminated waste material.
6. The Demolition Contractor shall submit to the Architect prior to commencing of work the following:
    a. Written respiratory and notification program
    b. Written lead compliance program in accordance with OSHA regulations including:
        1) Training requirement certifications.
        2) Supervisor qualifications.
        3) Written compliance program specific to this project
        4) Respirators fit test records.
        5) Medical surveillance certificates.

7. The EPA and the DEP require Demolition debris with lead to be tested in accordance with the Toxicity Characteristic Leaching Procedure (TCLP) to determine the potential for significant amounts of lead to leach out of the waste. If the results are below the DEP standard (5.0 ppm), the waste may be disposed of in a conventional landfill for Demolition debris. If, however, the TCLP results are above the DEP standard, the waste must be disposed of in a DEP approved, hazardous waste landfill. The Demolition Contractor shall at own cost and expense perform all required testing of waste by the TCLP. The Demolition Contractor must submit to the Owner copy of tests performed and all waste shipment records prior to disposing of debris. The Owner reserves the right to have own TCLP samples collected to verify results. All disposal costs shall be at the Demolition Contractor responsibility.
8. The following references are cited as current applicable publications. This project is subject to compliance with all regulations including but not limited to:
   a. Commonwealth of Massachusetts, Department of Labor Standards.
   b. Commonwealth of Massachusetts, Department of Environmental Protection.
   c. U. S. Department of Labor, Occupational Safety and Health Administration Title 29 CFR 1910.1025 and 29 CFR Part 1926.62.
9. All above regulations are applicable to this project. Where there is a conflict between this section and the applicable regulations, the more stringent requirement shall prevail.

C. PCB's:
1. The Demolition Contractor shall be made aware that building materials (Material) including but not limited to painted surfaces, caulking, glue, coatings, and other building materials are likely to contain >1 ppm of Polychlorinated Biphenyls PCB's.
2. EPA does not require testing and therefore, no testing will be performed or permitted to be performed.
3. All the work of this Contract shall conform to the standard set by all applicable Federal, State and Local laws, regulations, ordinance, and guidelines.
4. The Demolition Contractor is solely responsible for means and methods, and techniques used for demolition and control. The Demolition Contractor shall collect and control PCB's contaminated debris and soil.
5. The Demolition Contractor shall at his own cost and expense comply with all laws, ordinance, rules, and regulations of Federal, State, Regional and Local authorities during prepping, sanding, cutting, burning, scraping, painting over, grinding and regarding handling, storing, and disposing of contaminated waste material and during demolition of the building.

E. Silica Dust:
1. The Demolition Contractor shall be made aware that building materials (Material) may contain Silica.
2. Due to the difficulty associated with exhaustive testing, the Owner has elected to direct the Demolition Contractor to assume that Silica was found.
3. The Demolition Contractor shall review and comply with most recent US Department of Labor Final Rule and shall take extra precautions to protect workers and other personnel on site.

PART 2 - PRODUCTS **NOT USED**

PART 3 – EXECUTION **NOT USED**

END OF SECTION

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for Quality-Control Services.

B. Quality-Control Services include inspections, tests, and related actions, including reports performed by Contractor, by independent agencies, and by governing authorities. They do not include contract enforcement activities performed by Architect.

C. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with Contract Document requirements.

D. Requirements of this Section relate to customized fabrication and installation procedures, not production of standard products.

1. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified inspections, tests, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with Contract Document requirements.
3. Requirements for Contractor to provide quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.03 RESPONSIBILITIES

A. Contractor Responsibilities: The Contractor shall provide inspections, tests, and other similar Quality-Control Services specified in individual Specification Sections and as required by governing authorities. Costs for these services are included in the Contract Sum.

1. The Contractor shall employ and pay a qualified independent testing agency to perform specified Quality-Control Services.
2. Where the Owner has engaged an independent testing agency for testing and inspecting part of the Work, and the Contractor is also required to engage a testing entity for the same or related part or element of the Work, the Contractor shall not employ the entity engaged by the Owner, unless agreed to in writing by the Owner.

3. Re-testing: The Contractor is responsible for retesting where results of inspections, tests, or other quality-control services prove unsatisfactory and indicate noncompliance with Contract Document requirements, regardless of whether the original test was Contractor's responsibility.
    a. The cost of re-testing construction, revised or replaced by the Contractor, is the Contractor's responsibility where required tests performed on original construction.
4. Associated Services: The Contractor shall cooperate with agencies performing required inspections, tests, and similar services, and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include, but are not limited to, the following:
    a. Provide access to the Work and furnish incidental labor, facilities and equipment necessary to facilitate inspections and tests.
    b. Take adequate quantities of representative samples of materials that require testing or assist the agency in taking samples.
    c. Provide facilities for storage and curing of test samples.
    d. Provide security and protection of samples and test equipment at the Project Site.

B. Owner Responsibilities: The Owner will engage and pay for the services of an independent testing agency to perform inspections, tests or other Quality-Control Services specified to be performed by independent testing agencies and not specified as the responsibility of the Contractor and/or are provided for by another identified entity. Costs for these services are not included in the Contract Sum.
    1. The Owner shall employ and pay for the services of a qualified independent testing agency, testing laboratory or other qualified entity to perform Quality-Control Services, which are the Owner’s responsibility.

C. Duties of the Testing Agency: The independent agency engaged to perform inspections, sampling, and testing of materials and construction specified in individual Sections shall cooperate with the Architect and the Contractor in performance of the agency's duties. The testing agency shall provide qualified personnel to perform required inspections and tests.
    1. The agency shall notify the Architect and the Contractor promptly of irregularities or deficiencies observed in the Work during the performance of its services.
    2. The agency is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the Work.
    3. The agency shall not perform any duties of the Contractor.

D. Coordination: Coordinate the sequence of activities to accommodate required services with a minimum of delay. Coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.
    1. The Contractor is responsible for scheduling times for inspections, tests, taking samples, and similar activities.

1.04 SUBMITTALS

A. Unless the Contractor is responsible for this service, the independent testing agency shall submit a certified written report, in duplicate, of each inspection, test, or similar service to the Architect. If the Contractor is responsible for the service, submit a certified written report, in duplicate, of each inspection, test, or similar service through the Contractor.

1. Submit additional copies of each written report directly to the governing authority, when the authority so directs.
2. Report Data: Written reports of each inspection, test, or similar service include, but are not limited to, the following:
    a. Date of issue.
    b. Project title and number.
    c. Name, address, and telephone number of testing agency.
    d. Dates and locations of samples and tests or inspections.
    e. Names of individuals making the inspection or test.
    f. Designation of the Work and test method.
    g. Identification of product and Specification Section.
    h. Complete inspection or test data.
    i. Test results and an interpretation of test results.
    j. Ambient conditions at the time of sample taking and testing.
    k. Comments or professional opinion on whether inspected or tested Work complies with Contract Document requirements.
    l. Name and signature of laboratory inspector.
    m. Recommendations on retesting.

1.05 QUALITY ASSURANCE

A. Qualifications for Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories, that are prequalified as complying with the American Council of Independent Laboratories' "Recommended Requirements for Independent Laboratory Qualification" and that specialize in the types of inspections and tests to be performed.

1. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the State of Massachusetts.

1.06 WORK CONDITIONS / SEQUENCE

A. If sub-contractors find that conditions are not appropriate for them to begin the work of their trade or if they are directed to perform their work out of sequence by the General Contractor or if the General Contractor directs sub-contractors to start and continue regardless of job conditions, the sub-contractor shall so notify the Architect in writing by certified mail immediately.

PART 2 – PRODUCTS NOT USED

PART 3 - EXECUTION

3.01 REPAIR AND PROTECTION

A. General: Upon completion of inspection, testing, sample taking and similar services, repair damaged construction and restore substrates and finishes.

B. Protect construction exposed by or for quality-control service activities and protect repaired construction.

C. Repair and protection are the Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing, or similar services.

END OF SECTION

SECTION 01 42 00

REFERENCES

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. Indicated: The term indicated refers to graphic representations, notes, or schedules on the Drawings, or other Paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as shown, noted, scheduled, and specified are used to help the reader locate the reference. There is no limitation on location.

C. Directed: Terms such as directed, requested, authorized, selected, approved, required, and permitted mean directed by the Architect, requested by the Architect, and similar phrases.

D. Approved: The term approved, when used in conjunction with the Architect's action on the Contractor's submittals, applications, and requests, is limited to the Architect's duties and responsibilities as stated in the Conditions of the Contract.

E. Regulations: The term regulations include laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

F. Furnish: The term furnish means supply and delivery to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations to the location within the project where the product will finally be installed.

G. Install: The term install describes operations at the Project site including the actual unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. Provide: The term provides means to furnish and install, complete and ready for the intended use.

I. Installer: An Installer is the Contractor, or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged in performing.

1. The term experienced, when used with the term Installer, means having a minimum of five (5) previous projects similar in size and scope to this Project, being familiar with the special requirements indicated, and having complied with requirements of the authority having jurisdiction.

2. Trades: Using terms such as carpentry is not intended to imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as carpenter. It also does not imply that the requirements specified apply exclusively to tradespersons of the corresponding generic name.
3. Assigning Specialists: Certain Sections of the Specifications require that specific construction activities shall be performed by specialists who are recognized experts in those operations. The specialists must be engaged for those activities, and their assignments are requirements over which the Contractor has no choice or option. However, the ultimate responsibility for fulfilling Contract requirements remains with the Contractor.
    a. This requirement shall not be interpreted to conflict with enforcing building codes and similar regulations governing the Work. It is also not intended to interfere with local trade union jurisdictional settlements and similar conventions.

J. Project site is the space available to the Contractor for performing construction activities either exclusively or in conjunction with others performing other work as part of the Project. The extent of the Project site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is located.

K. Testing Agencies: A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project site or elsewhere, and to report on and, if required, to interpret the results of those inspections or tests.

1.03 SPECIFICATION FORMAT AND CONTENT EXPLANATION

A. Specification Format: These Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 16 Division format and MASTERFORMAT numbering system.

B. Specification Content: This Specification uses certain conventions regarding the style of language and the intended meaning of certain terms, words, and phrases when used situations or circumstances. These conventions are explained as follows:

1. Abbreviated Language: Language used in Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words that are implied, but not stated, shall be interpolated, as the sense requires. Singular words will be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.
2. Imperative and streamlined language is used generally in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor, or by others when so noted.
    a. The words "shall be" are implied wherever a colon (:) is used within a sentence or phrase.

1.04 INDUSTRY STANDARDS

A. Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with the standards in effect as of the date of the Contract Documents.

C. Conflicting Requirements: Where compliance with two (2) or more standards is specified and where the standards may establish different or conflicting requirements for minimum quantities or quality levels, refer requirements that are different but apparently equal and other uncertainties to the Architect for a decision before proceeding.

1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the Architect for a decision before proceeding.

D. Copies of Standards: Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, the Contractor shall obtain copies directly from the publication source.

E. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards generating organization, authority having jurisdiction, or other entity applicable to the context of the Text provision. Refer to the "Encyclopedia of Associations", published by Gale Research Co., available in most libraries.

F. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. The following acronyms or abbreviations, as referenced in Contract Documents, are defined to mean the associated names. Names and addresses are subject to change and are believed, but not ensured, to be accurate and up to date as of the date of Contract Documents.

AA	**Aluminum Association** **900 19th St., NW, Suite 300** **Washington, DC 20006**	**(202) 862-5100**
AABC	**Associated Air Balance Council** **1518 K St., NW** **Washington, DC 20005**	**(202) 737-0202**
AAMA	**American Architectural Manufacturers Association** **1540 E. Dundee Road, Suite 310** **Palatine, IL 60067**	**(708) 202-1350**
AASHTO	**American Association of State Highway and Transportation Officials** **444 North Capitol St., Suite 225** **Washington, DC 20001**	**(202) 624-5800**

AATCC	**American Association of Textile Chemists and Colorists** **P.O. Box 12215** **Research Triangle Park, NC**	**(919) 549-8141**
ACI	**American Concrete Institute** **P.O. Box 19150** **Detroit, MI 48219**	**(313) 532-2600**
ACIL	**American Council of Independent Laboratories** **1629 K St., NW** **Washington, DC 20006**	**(202) 887-5872**
ACPA	**American Concrete Pipe Association** **8300 Boone Blvd., Suite 400** **Vienna, VA 22182**	**(703) 821-1990**
ADC	**Air Diffusion Council** **One Illinois Center, Suite 200** **111 East Wacker Drive** **Chicago, IL 60601-4298**	**(312) 616-0800**
AFBMA	**Anti-Friction Bearing Manufacturers Association** **1101 Connecticut Ave., NW, Suite 700** **Washington, DC 20036**	**(202) 429-5155**
AGA	**American Gas Association** **1515 Wilson Blvd.** **Arlington, VA 22209**	**(703) 841-8400**
AHA	**American Hardboard Association** **520 North Hicks Road** **Palatine, IL 60067**	**(708) 934-8800**
AHAM	**Association of Home Appliance Manufacturers** **20 North Wacker Drive** **Chicago, IL 60606**	**(312) 984-5800**
AI	**Asphalt Institute** **Research Park Drive** **P.O. Box 14052** **Lexington, KY 40512-4052**	**(606) 288-4960**
AIA	**American Institute of Architects** **1735 New York Ave., NW** **Washington, DC 20006**	**(202) 626-7300**
A.I.A.	**American Insurance Association** **1130 Connecticut Ave., NW, Suite 1000** **Washington, DC 20036**	**(202) 828-7100**

AIHA	**American Industrial Hygiene Association** **P.O. Box 8390** **345 White Pond Drive** **Akron, OH 44320**	**(216) 873-2442**
AISC	**American Institute of Steel Construction** **One East Wacker Drive, Suite 3100** **Chicago, IL 60601-2001**	**(312) 670-2400**
AITC	**American Institute of Timber Construction** **11818 SE Mill Plain Blvd., Suite 415** **Vancouver, WA 98684**	**(206) 254-9132**
ALI	**Associated Laboratories, Inc.** **500 South Vermont Street** **Palatine, IL 60067**	**(708) 358-7400**
ALSC	**American Lumber Standards Committee** **P.O. Box 210** **Germantown, MD 20875**	**(301) 972-1700**
AMCA	**Air Movement and Control Association** **30 W. University Drive** **Arlington Heights, IL 60004-1893**	**(708) 394-0150**
ANSI	**American National Standards Institute** **11 West 42nd Street, 13th Floor** **New York, NY 10036**	**(212) 642-4900**
AOAC	**Association of Official Analytical Chemists** **2200 Wilson Blvd., Suite 400** **Arlington, VA 22201-3301**	**(703) 522-3032**
AOSA	**Association of Official Seed Analysts** **c/o Larry J. Prentice** **268 Plant Science 1ANR-UNL, Box 19281** **Lincoln, NE 68583-0911**	**(402) 472-8649**
APA	**American Plywood Association** **P.O. Box 11700** **Tacoma, WA 98411**	**(206) 565-6600**
API	**American Petroleum Institute** **1220 L St., NW** **Washington, DC 20005**	**(202) 682-8000**
ARI	**Air Conditioning and Refrigeration Institute** **1501 Wilson Blvd., 6th Floor** **Arlington, VA 22209**	**(703) 524-8800**
ARMA	**Asphalt Roofing Manufacturers Association** **6288 Montrose Rd.** **Rockville, MD 20852**	**(301) 231-9050**

ASA	**Acoustical Society of America** **500 Sunnyside Blvd.** **Woodbury, NY 11797**	**(516) 349-7800**
ASC	**Adhesive and Sealant Council** **1627 K Street, NW, Suite 1000** **Washington, DC 20006-1707**	**(202) 452-1500**
ASHRAE	**American Society of Heating, Refrigerating and Air-Conditioning Engineers** **1791 Tullie Circle, NE** **Atlanta, GA 30329**	**(404) 636-8400**
ASME	**American Society of Mechanical Engineers** **345 East 47th St.** **New York, NY 10017**	**(212) 705-7722**
ASPE	**American Society of Plumbing Engineers** **3617 Thousand Oaks Blvd., Suite 210** **Westlake, CA 91362**	**(805) 495-7120**
ASSE	**American Society of Sanitary Engineering** **P.O. Box 40362** **Bay Village, OH 44140**	**(216) 835-3040**
ASTM	**American Society for Testing and Materials** **1916 Race St.** **Philadelphia, PA 19103-1187**	**(215) 977-9679**
ATIS	**Alliance for Telecommunications Industry Solutions** **1200 G Street, NW, Suite 500** **Washington, DC 20005**	**(202) 628-6380**
AWCMA	**American Window Covering Manufacturers Association** **355 Lexington Avenue** **New York, NY 10017**	**(212) 661-4261**
AWI	**Architectural Woodwork Institute** **P.O. Box 1550** **13924 Braddock Rd., Suite 100** **Centreville, VA 22020**	**(703) 222-1100**
AWPA	**American Wood Preservers' Association** **4128-1/2 California Ave. SW, No. 171** **Seattle, WA 98116**	**(206) 937-5338**
AWPB	**American Wood Preservers Bureau** **4 E. Washington Street** **Newnan, GA 30263**	**(404) 254-9877**

AWS	**American Welding Society** **550 LeJeune Road, NW** **P.O. Box 351040** **Miami, FL 33135**	**(305) 443-9353**
AWWA	**American Water Works Association** **6666 West Quincy Avenue** **Denver, CO 80235**	**(303) 794-7711**
BHMA	**Builders' Hardware Manufacturers Association** **355 Lexington Ave., 17th Floor** **New York, NY 10017**	**(212) 661-4261**
BIA	**Brick Institute of America** **11490 Commerce Park Drive** **Reston, VA 22091**	**(703) 620-0010**
BIFMA	**Business and Institutional Furniture Manufacturers Assoc.** **2335 Burton Street, SE** **Grand Rapids, MI 49506**	**(616) 243-1681**
CAGI	**Compressed Air and Gas Institute** **c/o John H. Addington** **Thomas Associates, Inc.** **1300 Sumner Avenue** **Cleveland, OH 44115-2851**	**(216) 241-7333**
CAUS	**Color Association of the United States** **409 West 44th Street** **New York, NY 10036**	**(212) 582-6884**
CBM	**Certified Ballast Manufacturers Association** **Hanna Building, No. 772** **1422 Euclid Avenue** **Cleveland, OH 44115-2851**	**(216) 241-0711**
CCC	**Carpet Cushion Council** **P.O. Box 546** **Riverside, CT 06878**	**(203) 637-1312**
CDA	**Copper Development Association** **2 Greenwich Office Park, Box 1840** **Greenwich, CT 06836**	**(203) 625-8210**
CFFA	**Chemical Fabrics & Film Association, Inc.** **c/o Thomas Associates, Inc.** **1300 Sumner Avenue** **Cleveland, OH 44115-2851**	**(216) 241-7333**
CGA	**Compressed Gas Association** **1725 Jefferson Davis Highway, Suite 1004** **Arlington, VA 22202-4100**	**(703) 979-0900**

CISCA	**Ceiling and Interior Systems Construction Association** **5700 Old Orchard Road, 1st Floor** **Skokie, IL 60077**	**(708) 965-2776**
CISPI	**Cast Iron Soil Pipe Institute** **5959 Shallowford Road, Suite 419** **Chattanooga, TN 37421**	**(615) 892-0137**
CRI	**Carpet and Rug Institute** **P.O. Box 2048** **Dalton, GA 30722**	**(404) 278-3176**
CRSI	**Concrete Reinforcing Steel Institute** **933 Plum Grove Road** **Schaumburg, IL 60173**	**(708) 517-1200**
DHI	**Door and Hardware Institute** **14170 New Brook Drive** **Chantilly, VA 22022**	**(703) 222-2010**
DIPRA	**Ductile Iron Pipe Research Association** **245 Riverchase Parkway East, Suite O** **Birmingham, AL 35244**	**(205) 988-9870**
DLPA	**Decorative Laminate Products Association** **600 South Federal Street, Suite 400** **Chicago, IL 60605**	**(312) 922-6222**
ECSA	**Exchange Carriers Standards Association** **5430 Grosvenor Lane, Suite 200** **Bethesda, MD 20814**	**(301) 564-4505**
EIA	**Electronic Industries Association** **2001 Pennsylvania Avenue, NW** **Washington, DC 20006-1813**	**(202) 457-4900**
EIMA	**Exterior Insulation Manufacturers Association** **2759 State Road 580, Suite 112** **Clearwater, FL 34621**	**(813) 726-6477**
EJMA	**Expansion Joint Manufacturers Association** **25 North Broadway** **Tarrytown, NY 10591**	**(914) 332-0040**
ETL	**ETL Testing Laboratories, Inc.** **P.O. Box 2040** **Route 11, Industrial Park** **Cortland, NY 13045**	**(607) 753-6711**
FCI	**Fluid Controls Institute** **P.O. Box 9036** **Morristown, NJ 07960**	**(201) 829-0990**

FCIB	**Floor Covering Installation Board** **310 Holiday Avenue** **Dalton, GA 30720**	**(706) 226-5488**
FGMA	**Flat Glass Marketing Association** **White Lakes Professional Building** **3310 Southwest Harrison** **Topeka, KS 66611-2279**	**(913) 266-7013**
FM	**Factory Mutual Research Organization** **1151 Boston-Providence Turnpike** **P.O. Box 9102** **Norwood, MA 02062**	**(617) 762-4300**
GA	**Gypsum Association** **810 First Street, NE, Suite 510** **Washington, DC 20002**	**(202) 289-5440**
HEI	**Heat Exchange Institute** **c/o John H. Addington** **Thomas Associates, Inc.** **1300 Sumner Avenue** **Cleveland, OH 44115-2851**	**(216) 241-7333**
HI	**Hydronics Institute** **P.O. Box 218** **35 Russo Place** **Berkeley Heights, NJ 07922**	**(908) 464-8200**
H.I.	**Hydraulic Institute** **30200 Detroit Road** **Cleveland, OH 44145-1967**	**(216) 899-0010**
HMA	**Hardwood Manufacturers Assoc.** **400 Penn Center Blvd.** **Pittsburgh, PA 15235**	**(412) 829-0770**
HPMA	**Hardwood Plywood Manufacturers Assoc.** **1825 Michael Farraday Drive** **P.O. Box 2789** **Reston, VA 22090-2789**	**(703) 435-2900**
IBD	**Institute of Business Designers** **341 Merchandise Mart** **Chicago, IL 60654**	**(312) 647-1950**
ICEA	**Insulated Cable Engineers Association, Inc.** **P.O. Box 440** **South Yarmouth, MA 02664**	**(508) 394-4424**

IEC	**International Electrotechnical Commission** **(Available from ANSI)** **1430 Broadway** **New York, NY 10018**	**(212) 354-3300**
IEEE	**Institute of Electrical and Electronic Engineers** **345 East 47th Street** **New York, NY 10017**	**(212) 705-7900**
IESNA	**Illuminating Engineering Society of North America** **345 East 47th Street** **New York, NY 10017**	**(212) 705-7926**
IGCC	**Insulating Glass Certification Council** **c/o ETL Testing Laboratories, Inc.** **P.O. Box 2040** **Route 11, Industrial Park** **Cortland, NY 13045**	**(607) 753-6711**
IMSA	**International Municipal Signal Association** **165 East Union Street** **P.O. Box 539** **Newark, NY 14513**	**(315) 331-2182**
IRI	**Industrial Risk Insurers** **85 Woodland Street** **Hartford, CT 06102**	**(203) 520-7300**
ISA	**Instrument Society of America** **P.O. Box 12277** **67 Alexander Drive** **Research Triangle Park, NC 27709**	**(919) 549-8411**
KCMA	**Kitchen Cabinet Manufacturers Association** **1899 Preston White Drive** **Reston, VA 22091-4326**	**(703) 264-1690**
LIA	**Lead Industries Association, Inc.** **295 Madison Avenue** **New York, NY 10017**	**(212) 578-4750**
LPI	**Lightning Protection Institute** **3365 North Arlington Heights Road, Suite J** **Arlington Heights, IL 60004**	**(708) 255-3003**
MCAA	**Mechanical Contractors Association of America** **1385 Piccard Drive** **Rockville, MD 20850-4329**	**(301) 869-5800**

ML/SFA	**Metal Lath/Steel Framing Association (A Division of the National Association of Architectural Metal Manufacturers) 600 South Federal Street, Suite 400 Chicago, IL 60605**	**(312) 922-6222**
MSS	**Manufacturers Standardization Society of the Valve and Fittings Industry 127 Park Street, NE Vienna, VA 22180**	**(703) 281-6613**
NAAMM	**National Association of Architectural Metal Manufacturers 600 South Federal Street, Suite 400 Chicago, IL 60605**	**(312) 922-6222**
NAIMA	**North American Insulation Manufacturers Association 44 Canal Center Plaza, Suite 310 Alexandria, VA 22314**	**(703) 684-0084**
NBHA	**National Builders Hardware Association (Now DHI)**	
NCMA	**National Concrete Masonry Association P.O. Box 781 Herndon, VA 22070-0781**	**(703) 435-4900**
NCRPM	**National Council on Radiation Protection and Measurements 7910 Woodmont Avenue, Suite 800 Bethesda, MD 20814**	**(301) 657-2652**
NCSPA	**National Corrugated Steel Pipe Association 2011 Eye Street, NW Washington, DC 20006**	**(202) 223-2217**
NEC	**National Electrical Code (from NFPA)**	
NECA	**National Electrical Contractors Association 7315 Wisconsin Avenue Bethesda, MD 20814**	**(301) 657-3110**
NEMA	**National Electrical Manufacturers Association 2101 L Street, NW, Suite 300 Washington, DC 20037**	**(202) 457-8400**
NETA	**International Electrical Testing Association P.O. Box 687 Morrison, CO 80465**	**(303) 467-0526**

NFPA	**National Fire Protection Association** **One Batterymarch Park** **P.O. Box 9101** **Quincy, MA 02269-9101**	**(617) 770-3000** **(800) 344-3555**
N.F.P.A.	**National Forest Products Association** **1250 Connecticut Avenue, NW, Suite 200** **Washington, DC 20036**	**(202) 463-2700**
NHLA	**National Hardwood Lumber Association** **P.O. Box 34518** **Memphis, TN 38184-0518**	**(901) 377-1818**
NKCA	**National Kitchen Cabinet Association** **(Now KCMA)**	
NLGA	**National Lumber Grades Authority** **1055 West Hastings Street, Suite 260** **Vancouver, British Columbia** **Canada V6E 2E9**	**(604) 687-2171**
NOFMA	**National Oak Flooring Manufacturers Association** **P.O. Box 3009** **Memphis, TN 38173-0009**	**(901) 526-5016**
NPA	**National Particleboard Association** **18928 Premiere Court** **Gaithersburg, MD 20879**	**(301) 670-0604**
NPCA	**National Paint and Coatings Association** **1500 Rhode Island Avenue, NW** **Washington, DC 20005**	**(202) 462-6272**
NRCA	**National Roofing Contractors Association** **10255 West Higgins Road, Suite 600** **Rosemont, IL 60018-5607**	**(708) 299-9070**
NSF	**National Sanitation Foundation** **3475 Plymouth Road** **P.O. Box 1468** **Ann Arbor, MI 48106**	**(313) 769-8010**
NWMA	**National Woodwork Manufacturers Association** **(Now NWWDA)**	
NWWDA	**National Wood Window and Door Association** **1400 East Touhy Avenue, #G54** **Des Plaines, IL 60018**	**(708) 299-5200**
PCA	**Portland Cement Association** **5420 Old Orchard Road** **Skokie, IL 60077**	**(708) 966-6200**

PCI	**Precast/Prestressed Concrete Institute** **175 West Jackson Blvd.** **Chicago, IL 60604**	**(312) 786-0300**
PDI	**Plumbing and Drainage Institute** **c/o Sol Baker** **1106 West 77th Street, South Drive** **Indianapolis, IN 46260**	**(317) 251-6970**
PEI	**Porcelain Enamel Institute** **1101 Connecticut Avenue, NW, Suite 700** **Washington, DC 20036**	**(202) 857-1134**
RFCI	**Resilient Floor Covering Institute** **966 Hungerford Drive, Suite 12-B** **Rockville, MD 20805**	**(301) 340-8580**
RIS	**Redwood Inspection Service** **405 Enfrente Drive, Suite 200** **Novato, CA 94949**	**(415) 382-0662**
RMA	**Rubber Manufacturers Association** **1400 K Street, NW** **Washington DC 20005**	**(202) 682-4800**
SDI	**Steel Deck Institute** **P.O. Box 9506** **Canton, OH 44711**	**(216) 493-7886**
S.D.I.	**Steel Door Institute** **30200 Detroit Road** **Cleveland, OH 44145**	**(216) 889-0010**
SGCC	**Safety Glazing Certification Council** **c/o ETL Testing Laboratories** **Route 11, Industrial Park** **Cortland, NY 13045**	**(607) 753-6711**
SHLMA	**Southern Hardwood Lumber Manufacturers Association (Now HMA)**	
SIGMA	**Sealed Insulating Glass Manufacturers Association** **401 North Michigan Avenue** **Chicago, IL 60611**	**(312) 644-6610**
SMA	**Screen Manufacturers Association** **3950 Lake Shore Drive, Suite 502-A** **Chicago, IL 60613-3431**	**(312) 525-2644**
SMACNA	**Sheet Metal and Air Conditioning Contractors National Association** **4201 Lafayette Center Drive** **Chantilly, VA 22021**	**(703) 803-2980**

SPIB	**Southern Pine Inspection Bureau** **4709 Scenic Highway** **Pensacola, FL 32504**	**(904) 434-2611**
SPRI	**Single Ply Roofing Institute** **20 Walnut Street** **Wellesley Hills, MA 02189**	**(617) 237-7879**
SSPC	**Steel Structures Painting Council** **4400 Fifth Avenue** **Pittsburgh, PA 15213-2683**	**(412) 268-3327**
SSPMA	**Sump and Sewage Pump Manufacturers Association** **P.O. Box 298** **Winnetka, IL 60093**	**(708) 835-8911**
SWI	**Steel Window Institute** **c/o Thomas Associates, Inc.** **1300 Sumner Ave,** **Cleveland, OH 44115-2851**	**(216) 241-7333**
SWPA	**Submersible Wastewater Pump Association** **600 South Federal Street, Suite 400** **Chicago, IL 60605**	**(312) 922-6222**
TIMA	**Thermal Insulation Manufacturers Association** **29 Bank Street** **Stamford, CT 06901** **(Standards now issued by NAIMA)**	**(203) 324-7533**
TPI	**Truss Plate Institute** **583 D'Onofrio Drive, Suite 200** **Madison, WI 53719**	**(608) 833-5900**
UFAC	**Upholstered Furniture Action Council** **Box 2436** **High Point, NC 27261**	**(919) 885-5065**
UL	**Underwriters Laboratories, Inc.** **333 Pfingsten Road** **Northbrook, IL 60062**	**(708) 272-8800**
USP	**U.S. Pharmacopoeial Convention** **12601 Twinbrook Parkway** **Rockville, MD 20852**	**(301) 881-0666**
WCLIB	**West Coast Lumber Inspection Bureau** **P.O. Box 23145** **Portland, OR 97223**	**(503) 639-0651**

WCMA	**Wallcovering Manufacturers Association** **355 Lexington Avenue, 17th Floor** **New York, NY 10017** **(WCMA has moved from this location, perhaps to the Chicago area. Address and telephone number not confirmed.)**	**(212) 661-4261**
WIC	**Woodwork Institute of California** **P.O. Box 11428** **Fresno, CA 93773-1428**	**(209) 233-9035**
WRI	**Wire Reinforcement Institute** **1101 Connecticut Avenue NW, Suite 700** **Washington, DC 20036-4303**	**(202) 429-5125**
WSC	**Water Systems Council** **600 South Federal Street, Suite 400** **Chicago, IL 60605**	**(312) 922-6222**
WSFI	**Wood and Synthetic Flooring Institute** **4415 West Harrison Street, Suite 242-C** **Hillside, IL 60162**	**(708) 449-2933**
WLPDIA	**Western Lath, Plaster, Drywall Industries Association** **(Formerly California Lath & Plaster Association)** **8635 Navajo Road** **San Diego, CA 92119**	**(619) 466-9070**
WWPA	**Western Wood Products Association** **Yeon Building** **522 SW 5th Avenue** **Portland, OR 97204-2122**	**(503) 224-3930**
W.W.P.A.	**Woven Wire Products Association** **2515 North Nordica Avenue** **Chicago, IL 60635**	**(312) 637-1359**

G. Federal Government Agencies: Names and titles of federal government standard or Specification-producing agencies are often abbreviated. The following acronyms or abbreviations referenced in the Contract Documents indicate names of standard or Specification-producing agencies of the federal government. Names and addresses are subject to change but are believed to be, but are not assured to be, accurate and up to date as of the date of the Contract Documents.

CE	**Corps of Engineers** **(U.S. Department of the Army)** **Chief of Engineers – Referral** **Washington, DC 20314**	**(202) 272-0660**
CFR	**Code of Federal Regulations** **(Available from the Government Printing Office)** **North Capitol Street between G and H Streets, NW** **Washington, DC 20402**	

(Material is usually first published in the "Federal Register")
(202) 783-3238

CPSC	**Consumer Product Safety Commission** **5401 Westbard Avenue** **Bethesda, MD 20207**	**(301) 492-6580** **(800) 638-2772**
CS	**Commercial Standard** **(U.S. Department of Commerce)** **Washington, DC 20230**	**(202) 482-2000**
DOC	**U.S. Department of Commerce** **14th Street and Constitution Avenue, NW** **Washington, DC 20230**	**(202) 482-2000**
DOT	**Department of Transportation** **400 Seventh Street, SW** **Washington, DC 20590**	**(202) 366-4000**
EPA	**Environmental Protection Agency** **401 M Street, SW** **Washington, DC 20460**	**(202) 382-2090**
FAA	**Federal Aviation Administration** **(U.S. Department of Transportation)** **800 Independence Avenue, SW** **Washington, DC 20590**	**(202) 366-4000**
FCC	**Federal Communications Commission** **1919 M Street, NW** **Washington, DC 20554**	**(202) 632-7000**
FHA	**Federal Housing Administration** **(U.S. Department of Housing and Urban Development)** **Director, Manufactured Housing and Construction Standards Division** **451 Seventh Street, SW, Room 9158** **Washington, DC 20201**	**(202) 755-5210**
FS	**Federal Specification (from GSA)** **Specifications Unit (WFSIS)** **7th and D Streets, SW** **Washington, DC 20407**	**(202) 708-9205**
GSA	**General Services Administration** **F and 18th Streets, NW** **Washington, DC 20405**	**(202) 708-5082**
MIL	**Military Standardization Documents** **(U.S. Department of Defense)** **Naval Publications and Forms Center** **5801 Tabor Avenue**	

	Philadelphia, PA 19120	
NIST	**National Institute of Standards and Technology** **(U.S. Department of Commerce)** **Gaithersburg, MD 20899**	**(301) 975-2000**
OSHA	**Occupational Safety and Health Administration** **(U.S. Department of Labor)** **N3647** **200 Constitution Avenue, NW** **Washington, DC 20210**	**(202) 219-8148**
PS	**Product Standard of NBS** **(U.S. Department of Commerce)** **Washington, DC 20230**	**(202) 482-2000**
REA	**Rural Electrification Administration** **(U.S. Department of Agriculture)** **14th Street and Independence Avenue, SW** **Washington, DC 20250**	**(202) 447-2791**
USDA	**U.S. Department of Agriculture** **14th Street and Independence Avenue, SW** **Washington, DC 20250**	**(202) 447-2791**
USPS	**U.S. Postal Service** **475 L'Enfant Plaza, SW** **Washington, DC 20260-0010**	**(202) 268-2000**

1.05 GOVERNING REGULATIONS AND AUTHORITIES

A. Copies of Regulations: Obtain copies of governing regulations and retain them at the Project site to be available for reference by parties who have a reasonable need, if requested by the Architect.

1.06 SUBMITTALS

A. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence, and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

PART 2 – PRODUCTS NOT USED

PART 3 – EXECUTION NOT USED

END OF SECTION

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SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 SUMMARY

A. This Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, security, and protection.

B. Temporary utilities required include, but are not limited to:
   1. Temporary power and lighting as specified in Division 260000.
   2. Temporary heat & winter conditions.

C. Temporary construction and support facilities required include, but are not limited to:
   1. Waste disposal services.
   2. Temporary yard and storage on and off-site.
   3. Construction aids and miscellaneous services and facilities.
   4. Sweeping compound.
   5. Emergency portable generators of size required if permanent power is temporarily unavailable.
   6. Water service and distribution if water supply to adjacent occupied spaces is temporarily unavailable.
   7. Parking

D. Security and protection facilities required include, but are not limited to:
   1. Temporary weather protection, enclosures, and covers.
   2. Temporary fire protection and fire watch if required by Worcester Fire Department.
   3. Barricades, warning signs, lights.
   4. Temporary partitions between occupied areas and construction areas, STC 48 or better.

E. Where a distinction is made in this specification section between temporary services to be provided by a General Contractor and those to be provided by a Subcontractor, the purpose is only to clarify which costs are to be included by the applicable parties for inclusion in the applicable bids and contracts that would follow. These distinctions have no bearing upon the Contract between the Owner and General Contractor and do not limit in any way the General Contractor's responsibility to provide all such temporary services without additional cost to the Owner. For the sake of clarity in this specification section, the term General Contractor has been used for the person called the Contractor in other specification sections, when the intent is that that person shall provide a service directly at his own expense rather than at the expense of one of the Subcontractors from whom the Owner has taken filed sub-bids.

F. The temporary services described in this specification section may not be adequate to provide for all the needs of the General Contractor or all Subcontractors but are intended only to provide a basis for obtaining filed sub-bids. The General Contractor or any Subcontractor requiring additional temporary services for the proper execution of his work or because of climatic conditions shall arrange for and obtain such services at his own expense without further compensation by the Owner.

G. The Contractor shall be responsible for restoring all landscaped areas affected by the work of this project to their original "like-new" state that existed prior to work commencing. This restoration work shall include, but not be limited to, planting beds with mulch, trees, shrubs, and lawn areas. Great care should be taken during the work not to damage nor destroy any landscaping impacted by this work. Any landscaping disturbed, damaged, or destroyed shall be restored, repaired, or replaced in-kind at no cost to the Owner.

H. Rubbish Removal

1. The General Contractor shall remove and dispose daily of all waste and debris caused by the Work of this Contract and legally dispose off-site to avoid large accumulations of construction and demolition waste.
2. The General Contractor shall provide dumpsters and waste barrels at designated drop off areas within the construction site.
3. Burning or on-site disposal of waste and debris are not allowed.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
2. Section 02 41 13 - Selective Demolition
3. Section 03 54 13 - Cementitious Underlayment
4. Section 04 20 00 – Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.04 SUBMITTALS

A. Schedule: Submit a schedule indicating implementation and termination of each temporary utility within fifteen (15) days of the date established for Commencement of the Work.

1.05 QUALITY ASSURANCE

A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction, including but not limited to:

1. Commonwealth of Massachusetts State Building Code requirements; 6th Edition.
2. Federal, State and City Health and safety regulations.
3. Utility company regulations.
4. Police, Fire Department and Rescue Squad rules.
5. Environmental protection regulations.

B. Standards: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction, including but not limited to:

1. NFPA Code 241.
2. NFPA 70.
3. ANSI A10.
4. NECA NJG-6.

C. Electric Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70.

D. Inspections: Arrange for authorities having jurisdiction to inspect and test temporary utilities prior to use. Obtain required certifications and permits.

1.06 PROJECT CONDITIONS

A. Temporary Utilities: At the earliest feasible time, when acceptable to the Owner, change from use of temporary service to use of permanent service.

B. Conditions of Use: Maintain temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload temporary facilities or permit them to interfere with progress. Do not allow hazardous, dangerous, unsanitary conditions, or public nuisances to develop or persist on the site.

C. Always maintain the continuity of all utility services across all Phases of the Construction Project, unless otherwise directed by the Architect or Owner.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: Provide new materials suitable for the use intended, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.

2.02 TEMPORARY WATER

A. Definitions:

1. Water Access Point: A point, within the Project area, at which water is available during construction.

B. Charges: The General Contractor shall pay for all facilities to provide water during construction, while the Owner will supply and pay for water during the construction. The General Contractors shall pay for backflow preventer if utilizing Owners Hydrant for water.

1. The furnishing of water by the Owner shall be conditional upon all contractors being conservative and prudent in its use. In the event of any contractor is repeatedly wasteful in the use of water thus provided, the Owner reserves the right to charge the General Contractor for wasteful usage at an equitable rate for the additional portion of water used.

C. Temporary Water: The General Contractor shall be responsible for all facilities to provide water during construction as defined above and further specified as follows:

1. Except under unusual circumstances, when otherwise specified or approved by the Architect, all water shall be of potable quality.
2. The General Contractor shall provide all necessary piping, valving, hose bibbs, hosing, etc. to provide temporary water during construction from a water access point determined by the Owner's Representative. Any facilities running within the building are required not to leak. Any damage incurred due to leaks shall be repaired at the expense of the General Contractor.
3. The General Contractor shall pay for and be responsible for the protection of Temporary Water, which he installs, from freezing and other damage.

2.03 TEMPORARY HEAT

A. Definitions:

1. Temporary Heating & Ventilating: The General Contractor shall provide temporary heat and ventilation, as needed, to work areas outside the building to maintain the minimum temperatures described below. The General Contractor shall also provide temporary heat and ventilation, as needed, to work areas inside the building to maintain an indoor temperature of 68 degrees Fahrenheit during the winter months and 75 degrees Fahrenheit during the summer months.

B. Charges: The General Contractor shall pay for all temporary heat and ventilation as defined above. The General Contractor shall pay for all fuel required for Temporary Heat and Ventilation. The Owner shall pay for all electrical energy use charges.

2. The furnishing of electrical energy by the Owner shall be conditional upon being conservative and prudent in its use. If any contractor is repeatedly wasteful in the use of electrical energy thus provided, the Owner reserves the right to charge the General Contractor at an equitable rate for the additional portion of electrical energy used.

C. Temporary Heating: Portable heating units shall be of sufficient capacity and number and shall be located so that damage to any part of the project from low temperature will be prevented and that concrete, masonry, and other components requiring curing shall be properly cured.

1. Heaters for temporary heat shall be temporary steam generators, forced air heaters, or other type heaters located outside the building or vented to the outside of the building. Type(s) shall be such as to not damage or stain construction or any part of the existing building. Heaters must be UL approved.
2. At no time will oil-burning "salamander" type heaters be used, nor will non-vented, open flame heaters be used inside the building.
3. Propane-type heaters shall not be used at any time within the area of the building or near stockpiles of combustible materials.
4. Temporary heating shall apply to winter conditions.

D. Temporary Ventilation: Portable ventilation units shall be of sufficient capacity and number and shall be located so that damage to any part of the project from excess humidity will be prevented and that concrete, masonry, and other components requiring curing shall be properly cured.

2.04 TEMPORARY POWER AND LIGHTING

A. Definitions:
1. Temporary Electric: The furnishing, installing, maintenance, and removal of all wiring, fusing, switches, outlets, lamps, and accessory electrical devices required to provide lighting and power needed by all construction trades for the duration of construction.

B. Charges: The General Contractor shall pay for all facilities for Temporary Electric. The Owner shall pay for all use charges for electrical energy.
1. The furnishing of electrical energy by the Owner shall be conditional upon all contractors being conservative and prudent in its use. If any contractor is repeatedly wasteful in the use of electrical energy thus provided, the Owner reserves the right to charge the General Contractor at an equitable rate for the additional portion of energy consumed.

C. Temporary Electricity: The General Contractor shall pay for and be responsible for Temporary Electric as defined above and further specified as follows:
1. The General Contractor shall provide temporary electricity during construction from an electrical service access point determined by the Owner's Representative.
2. The Temporary Electricity is expected to be used during normal working hours, as defined in Section 01010 – Summary of Work. No additional charge shall be made by the General Contractor for switching the system on and off to meet this time requirement.
3. Responsibility of compliance with local, state, and national codes for installation of the Temporary Electric service shall be borne by the General Contractor.
4. The General Contractor shall be responsible for servicing and maintaining all temporary lighting during the construction.
5. The General Contractor shall be responsible for paying for the following Temporary Electricity. This schedule will not necessarily provide for all the requirements of all contractors. The General Contractor or any Subcontractor having requirements for power, lighting, or service other than those provided herein, shall make the necessary arrangements to obtain such power, lighting, or service at his own expense.

a. The General Contractor shall obtain all necessary permits, shall furnish, and install the temporary electrical power and lighting systems, and shall pay for all labor, materials, and equipment required for this work. All such temporary electrical work shall meet the requirements of the Massachusetts Electrical Code and OSHA.

b. The Electrical Subcontractor shall furnish and install a feeder, or feeders, of sufficient capacity to provide additional lighting to the work areas, as required, to properly carry out the work. Temporary lighting shall be based on the following requirements:

   1) Rooms or spaces under 250 square feet: Two (2) 100-watt lamps.
   2) Rooms or spaces over 250 square feet and under 500 square feet: Four (4) 100-watt lamps.
   3) Rooms or spaces over 500 square feet and under 1,000 square feet: Two (2) 200-watt lamps.
   4) Rooms or spaces over 1,000 square feet: Two (2) 200-watt lamps for every 1,000 square feet or fraction thereof.
   5) Sufficient additional wiring outlets and lamps shall be installed to ensure proper lighting in stairwells, corridors, and passage areas.
   6) Temporary power, in addition to the lighting requirements, shall be provided throughout the building for electrically operated tools, based on a minimum of 0.50 watts per square foot.
   7) Outlets shall be located at convenient points so that extension cords not over 50 feet in length will reach all work requiring light or power.
   8) All Electrical Outlets shall be properly configured NEMA polarized outlets to prevent insertion of 110-120 volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light, for connection of power tools and equipment.
   9) All Electrical Power Cords shall be grounded extension cords that are “hard-service” type where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress.

a. All necessary cables, load centers, switches, and accessories required for the temporary light and power installation shall be provided and installed by the General Contractor.

b. The General Contractor shall furnish and install all lamps, both initial and replacement, before the Date of Substantial Completion.

c. Temporary light and power requirements herein required are for the use of all trades working at the site.

d. All Contractors and Subcontractors shall, individually, furnish all extension cords and lamps, sockets, motors, and accessories required for their work.

   1) All Electrical Power Cords shall be grounded extension cords that are “hard-service” type where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress.

e. Any of the Contractors or Subcontractors shall reimburse the General Contractor for any of the following:

1) Any temporary wiring of a special nature, other than that specified above, required for their work.
2) Any temporary wiring of construction offices and buildings used by them.
3) Any temporary wiring for protective night lighting.

f. The General Contractor shall be responsible for removing all temporary wiring, service equipment, and accessories when and as directed to by the General Contractor.

g. The provisions of the Massachusetts Electrical Code shall be strictly complied to, with special respect to Article 305 of said code, and the following precautions shall be taken:
1) Open conductors shall be fastened to the ceiling height at minimum of 10 feet intervals. Conductors may not be laid on the floor, and receptacles or fixed equipment circuits shall contain a separate equipment-grounding conductor if run as open wiring. Receptacles shall be of the grounding type. Branch circuits shall also be of the grounding type, unless installed in a complete metallic conductor and receptacles electrically connected to the grounding conductor. Neither bare conductors nor earth returns shall be used for wiring of any temporary circuits. Grounding circuits shall never be interrupted.
2) All 15 and 20-amp receptacle outlets on single phase circuits which are used for construction purposes shall be equipped with ground-fault circuit interrupters, reset button, and pilot lights as required by Article 210 of the Massachusetts Electrical Code.
3) All outlets shall be properly configured NEMA polarized outlets to prevent insertion of 110-120 volt plugs into higher voltage outlets.

2.05 TEMPORARY SANITARY FACILTIES

A. The General Contractor shall provide ample toilet facilities with proper enclosures for the use of workmen employed on the work to be as located within the construction areas on site were permitted by the Architect.
1. Provide the Architect with a schedule of maintenance and cleaning. Provide toilet facilities with hand washing sanitizer dispenser, paper towels, and cleaners.
2. Toilet facilities shall be installed and maintained in conformity with the governing laws and building code. They shall be properly lit, ventilated, and always kept clean.
3. At no time shall any Contractor Personnel use toilet facilities outside the work areas or in any Owner-occupied parts of the building.

2.06 TEMPORARY WEATHER PROTECTION

A. Definitions:
1. Weather Protection: The furnishing, installing, maintenance, and removal of temporary closures, covers, shields, and any other weather protection devices as required to protect work in place and permit construction to proceed during cold or inclement weather.

B. Weather Protection Standard: The following weather protection standards pursuant to Chapter 597 of the Acts of 1980, modifying Sections 44F and G of Chapter 149 of the General Laws, are hereby incorporated into this specification, and shall be considered supplementary to the temporary heating and temporary enclosure requirements. Under the provisions of Chapter 149, Section 44F(I) and Section 44G, Paragraph D, of the General Laws, General Contractors are required to provide weather protection to allow building construction to be carried on during the months of November through March. These standards do not require enclosures for heat for operations that are not economically feasible to protect in the judgment of the Awarding Authority, including for example, site work, excavation, pile driving, steel erection, erection of certain exterior panels, roofing, and the like.

1. The General Contractor shall provide and install weather protection.
2. Weather protection shall be provided during the months of November through March.
3. The temperature at the working surface shall be at least forty degrees Fahrenheit (40° F). This provision does not supersede any specific greater requirements for the methods of construction or curing of materials.
4. Weather protection materials, equipment, and the installation thereof, shall comply with all safety rules and regulations including the provisions for adequate ventilation and fire protection devices.
5. At completion of work, the General Contractor shall remove temporary weather protection and restore all surfaces to first class condition.
6. The General Contractor may choose, if the Awarding Authority approves, to use the permanent heating system for temporary heat after the building is enclosed and the system has been tested and is ready to operate.
    a. The General Contractor shall thoroughly clean and restore to first class condition, acceptable to the Awarding Authority, all portions of the permanent heating system that are used for heating during construction.
    b. Use of the permanent heating system for weather protection shall not affect any heating system guarantee that may be due to the Awarding Authority; such guarantee shall begin to run only when the Awarding Authority accepts the building.
7. Reporting Requirements:
    a. Within thirty (30) calendar days after the Contract Award the General Contractor shall submit, in writing to the Awarding Authority for approval, its proposed plan for weather protection. Refer to Section 01300 – Submittals for additional information regarding the appropriate procedure in preparing this submittal.
    b. The General Contractor shall furnish and install accurate Fahrenheit thermometers at places designated by the Awarding Authority to determine whether the required temperature is being maintained.

C. Temporary Covers and Enclosures:

1. Except as otherwise specified herein below, all costs of closing openings in new construction and the exterior of the existing buildings open to the weather, including temporary covers and enclosures, shall be borne by the General Contractor. Enclosures must be built around various portions of the new construction and new exterior openings in the existing building as the work progresses if, and as necessary to totally insure against the intrusion of rain, snow, and other moisture which might damage the new or existing materials or finishes and as necessary to maintain the minimum temperatures specified.
    a. Where roofs, exterior walls, windows, or other elements of new or existing buildings or structures providing weather protection are to be temporarily opened to the weather, they shall be fully enclosed or covered with securely attached and well-draining enclosures whenever inclement weather is occurring or is threatening, to assure absolute weather protection. All damage to the new or existing buildings or structures, including all materials and finishes thereon, caused by inadequate protection shall be made good by the General Contractor without further cost to the Owner.
2. All such weather tight enclosures shall provide a reasonable open area to permit drying of new wet materials while at the same time making it possible to maintain the required interior temperatures. The General Contractor shall provide sufficient continuous ventilation until the time that the "wet" work of the project has dried sufficiently to receive finished woodwork and other materials subject to moisture damage, at which time the ventilation shall be maintained at approximately the anticipated conditions of final use of the project.
3. The permanent doors and frames shall not be used as temporary enclosures prior to the time of delivery of finished woodwork or acoustical materials. Temporary wood or plywood doors with wood frames and proper hardware to make the doors self-closing shall be provided, instead, at the door openings.
4. As parts of the temporary enclosures, the permanent doors, windows, and fixed glass may be used, provided sufficient ventilation area is available and that extreme care is taken to prevent damage to the same. Where available ventilation area is limited, intake and discharge fans may be used to increase air movement through the construction areas. Before delivery of finished woodwork or other materials subject to moisture damage, the permanent windows, roof accessories, fixed glass, doors, and entrances must be in place. Spark-proof fans shall also be provided to remove toxic or obnoxious fumes from enclosed areas as may be required.
5. Once temporary enclosures are in place, a temperature of at least 55 degrees Fahrenheit shall be maintained within all interior workspaces. From the time of delivery of the first shipment of finished woodwork or other finished materials subject to moisture damage, a temperature of at least 60 degrees Fahrenheit shall be maintained within all interior spaces. Temperatures shall be maintained at this level until the time of substantial completion of the project or occupancy by the Owner, whichever is sooner, and shall not be discontinued until definite arrangements for same have been made by the Owner.

D. Weather Protection by Subcontractors: The General Contractor shall provide at his own expense all Weather Protection as defined above except as follows:

1. Each Subcontractor shall pay for and be responsible for the weather protection of his tools, devices, equipment, appliances, and appurtenances to use in the accomplishment of his work and for weather protection of materials furnished by him until such materials are incorporated as a physical part of the Project.
2. Protection and heating of aggregates and water for concrete and mortars shall be the responsibility and at the expense of the respective Subcontractors furnishing concrete and mortars.
3. Construction Water Facilities, furnished and installed by the General Contractor, shall be protected against freezing by the Contractor at his own expense.
4. Hoses, piping, and accessory devices installed and connected by others to the water facilities furnished by the Contractor shall be protected against freezing by the installer at his own expense.

2.07 TEMPORARY FIRE PROTECTION

A. The General Contractor shall take all necessary precautions for the prevention of fire during construction. He shall be responsible for ensuring that the area within the contract limits is kept orderly and clean and that combustible rubbish is promptly removed from the site. Combustible materials shall be stored on site in a manner and at locations approved by the Architect. The General Contractor shall comply with all suggestions regarding fire protection made by the Insurance Company with which the Owner maintains his fire insurance.

B. The General Contractor shall provide and maintain in good working order, under all conditions, readily available to all portions of the site and work, suitable and adequate fire protection equipment, and services. Such facilities shall include, but are not limited to, the furnishing and maintaining in good working order a minimum of two (2) standards, Underwriters' Laboratories labeled, 2-1/2-gallon capacity fire extinguishers per floor.

C. Smoking shall be prohibited on the premises and signs to this effect shall be posted conspicuously.

D. Fires shall not be built on the premises.

2.08 TEMPORARY CRANES, LIFTS, DERRICKS, AND HOISTING SERVICES

A. The General Contractor shall furnish, install, operate, and maintain in safe condition all crane services outside of the building for his own use and for the use of all Subcontractors on the project to properly carry out and complete the work, except as may otherwise be specifically provided for in any of the trade sections of the Specifications.

B. All crane services shall be provided at no cost to the Subcontractors for their work.

C. Each Subcontractor shall, however, provide their own lifts, derricks, hoisting services, etc. (excluding crane services outside the building) for their own work outside and inside the building to properly complete their work.

D. All cranes, lifts, derricks, and hoisting equipment, machinery, and operation shall comply in all respects to the governing laws and codes.

2.09 TEMPORARY STAGING AND SCAFFOLDING

A. The General Contractor shall furnish, erect, and maintain in safe condition all exterior and interior staging and scaffolding required for his own use.

B. Each of the Subcontractors shall furnish, erect, and maintain in safe condition all exterior and interior staging and scaffolding for their own use.

C. All staging and scaffolding shall be enclosed at the ground by a temporary construction fence as defined elsewhere in this Section.

D. Staging and scaffolding shall comply in all respects to the governing laws and codes.

2.10 TEMPORARY BRACING, SHORING, SHEETING, AND TIE-DOWNS

A. The General Contractor shall take all precautions to protect the Work against collapse or other damage by earth or construction loads, high winds, snow and rain loads, damage by adverse weather conditions or geological disturbances, or other cause, by temporary bracing shoring, sheeting, guying, lacing, covering, weighting, and other reasonable and prudent means.

2.11 TEMPORARY STAIRS, LADDERS, RAMPS, PLATFORMS, ETC.

A. The General Contractor shall provide and maintain all necessary temporary stairs, ladders, ramps, platforms, and other temporary construction required for the proper execution of the work, all of which shall comply with requirements of the governing laws and codes and/or as required by local building officials.

B. As soon as the permanent ladders and hatches are installed, the General Contractor shall provide temporary protective measures acceptable to the Architect to maintain their new condition until substantial completion, so to assure that such items will not be damaged as the remaining work progresses.

2.12 TEMPORARY FENCING, BARRIERS, AND PARTITIONS

A. Protection: The General Contractor shall be fully responsible for the security of the work areas of the site and for patrolling and protecting the work under construction and his and the Owner’s materials stored or otherwise located on the site.

B. Temporary Barricading: In addition, the General Contractor shall provide other temporary fencing, barricading, and overhead protection of substantial nature to protect workmen, other personnel, and the public against various hazards and attendant nuisances that come about as the work progresses such as, but not necessarily limited to, falling materials, dangerous excavations, dangerous projections, or obstructions, stored or stockpiled materials, etc. Comply fully with recommendations of the Association of General Contractors and provisions of the governing laws and codes.

Note: As part of requirement for overhead protection, include substantial, well-constructed, walkways covers sufficient to assure pedestrian safety, in accordance with recommendations of the Association of General Contractors and provisions of the governing laws and codes.

C. In addition, the General Contractor shall provide all necessary protective barriers within the existing building as required to assure the safety of persons and property wherever work of this Contract is being carried out. Include substantial, well-constructed, protective barriers at all construction work-limit-lines separating Contract work areas from areas occupied by the Owner. Also include flameproof dust-curtaining and block or filter mechanical return air systems in a safe manner, in cooperation with Mechanical trade, between areas where dust effusive work is being carried out and other interior areas of the new addition and existing building to prevent passage of dirt and dust. Barriers, curtaining, etc., must be self-supporting, and must not depend on building construction for primary structure or anchorage. Locations and quantities of barriers and dust curtaining shall always be subject to Owner's and Architect's approval, but such approval, or lack of inspection or approval, by the Owner or the Architect, shall not be construed as relieving the Contractor of any of his responsibilities under the Contract.

2.13 TEMPORARY STORAGE FACILITIES

A. Space for storage of materials shall be confined to the construction areas outside the building and as designated and/or approved by the Architect.

B. Locations where construction equipment may be stored during non-working hours shall be as acceptable to the Owner. Construction equipment shall not present a hazard when stored.

2.14 NOISE, DUST, AND POLLUTION CONTROL

A. All work performed under the Contract shall conform to the requirements of Chapter III, Section 31C and Section 142D of the General Laws, Commonwealth of Massachusetts and Rules and Regulations adopted thereto by the Commonwealth of Massachusetts, Department of Public Health, and the requirements of local noise, dust, and pollution control laws, ordinances, and regulative agencies applicable to the work.

B. The General Contractor shall provide temporary partitions to prevent noise, dust, pollution or order from entering occupied spaces. Temporary partitions shall have STC of 50. Submit location plan and type of construction for temporary partitions for approval.

C. Control of air borne dust or pollution from the site with spray or as otherwise may be necessary to prevent the migration of any dust or pollutants.

D. Dust Control: Use water mist, temporary enclosures, and other suitable methods to limit spread of dust and dirt. Comply with governing environmental protection regulations.

1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, or pollution.
2. Vacuum equipment shall be equipped with HEPA filters.
3. Vacuum carpeted areas.
4. Wet mop floors to eliminate trackable dirt.
5. Sweeping shall be allowed only with the use of a non-oil based sweeping compound followed by vacuuming any remaining residue.
6. Wipe down walls and doors of demolition enclosure.

E. Disposal: Remove and transport debris, in a manner that will prevent spillage on adjacent surfaces and areas, to the construction dumpster(s).

F. Cleaning: Clean areas adjacent to the work area of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

2.15 WATER CONTROL

A. The General Contractor shall be responsible for site drainage and snow removal within the limit-of-work lines and shall maintain such drainage and removal during the life of the Contract in a manner approved by the Owner and Architect, and so as not to adversely affect the adjacent areas.

B. Water from the Work of this Project shall be disposed of in such a manner as not to be a threat to public health nor cause damage to public or private property. It shall not be disposed of over surfaces of roads, walks, and streets, nor be permitted to cause any interference with the normal use of the same.

C. Removal of snow and ice from within the limit-of-work lines at the site as required to maintain the continual progress of the work, including that required to keep work areas, access roads, and storage areas clear, free, and in use, and as required to prevent damage to existing construction and new work in places.

2.16 CONSTRUCTION CLEANING AND CONSTRUCTION DUMPSTERS

A. The General Contractor shall provide and pay for temporary dumpster type trash containers outside the building for use by all Subcontractors, and shall have the containers replaced, hauled away, and the contents legally disposed of at sufficient intervals to always maintain them in sufficiently empty condition that they are ready to receive trash and debris.

B. All construction dumpsters shall be located in the parking lot within the construction staging area and were permitted by the Owner.

C. Each Contractor on the project shall be responsible for removing their own trash and debris from the building to the construction dumpster(s).

D. Waste materials and rubbish, which might otherwise raise dust, shall be sprinkled during handling and loading to minimize this effect. Debris shall be carried out of the structure in containers or dropped in fully enclosed chutes and shall not be passed through, or thrown from, windows or other wall openings, and in no case shall the debris or trash be permitted to drop freely from the openings.

E. The Work Areas shall be inspected daily and all debris, waste, rubbish, etc. shall be removed and placed in a dumpster.

F. All waste materials and rubbish shall be disposed of legally, off site.

2.17 TEMPORARY RODENT AND PEST CONTROL

A. Rodent and Pest Control: Provide rodent control as necessary to prevent infestation of construction and storage areas. Employ methods and use materials, which will not adversely affect conditions at the site or on adjoining properties. Should rodenticides be considered necessary submit copies of proposed program to Owner and Architect. Use of rodenticide shall comply with manufacturer’s published instructions and recommendations. Clearly indicate:

1. Area or areas to be treated.

2. Rodenticides to be used.
3. Manufacturer's printed instructions.
4. Pollution preventive measures to be employed.

2.18 WATCHMEN, FLAGMEN, AND POLICE DETAILS

A. The General Contractor shall provide the services of flagmen, traffic directors, and police details as necessary and as required by authorities having jurisdiction. Please refer to Section 01010 – Summary of Work for additional information regarding the police details and the appropriate pay rates.

2.19 PARKING

A. Parking will be permitted on site or as directed by the owner.

PART 3 - EXECUTION

3.01 OPERATION, TERMINATION AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.

B. Maintenance: Maintain facilities in good operating condition, until removal. Protect from damage. If damage occurs, repair it immediately upon discovery. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour per day basis.

C. Termination and Removal: Unless the Architect requests that it be maintained longer, remove each temporary facility when the need has ended. Clean and renovate permanent facilities that have been used during construction period, including:

1. Replace air filters and clean inside of ductwork and housings.
2. Replace worn parts.
3. Replace lamps.

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 SUMMARY

A. This Section specifies administrative and procedural requirements governing the Contractor's selection of products for use in the Project.

B. Reference Standards and Definitions: Refer to Section 014200 “References” for the applicability of industry standards to products specified.

C. The Contractor’s Construction Schedule and the Submittal Schedule are specified under Section 013300 “Submittals Procedures”.

D. Administration procedures for handling requests for substitutions made after award of the Contract are specified under Section 012500 “Substitution Procedures”.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
2. Section 02 41 13 - Selective Demolition
3. Section 03 54 13 - Cementitious Underlayment
4. Section 04 20 00 – Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical

17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.04 DEFINITIONS

A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties", "systems", "structure", "finishes", "accessories", and similar terms. Such terms are self-explanatory and have well-recognized meanings in the construction industry.

20. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material", "equipment", "system", and terms of similar intent.
    a. "Named Products" are items identified by the manufacturer's product name, including make or model number or other designation, shown or listed in the manufacturer's published product literature that is current as of the date of the Contract Documents.
21. "Materials" are products substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
22. "Equipment" is a product with operational parts, whether motorized or manually operated, that require service connections, such as wiring or piping.

1.05 SUBMITTALS

A. Product List: Prepare a schedule in tabular form showing each product listed. Include the manufacturer's name and proprietary product names for each item listed.

1. Coordinate product list with the Contractor's Construction Schedule and the Schedule of Submittals.
2. Form: Prepare product list with information on each item tabulated under the following column headings:
    a. Related Specification Section number.
    b. Generic name used in Contract Documents.
    c. Proprietary name, model number, and similar designations.
    d. Manufacturer's name and address.
    e. Supplier's name and address.
    f. Installer's name and address.
    g. Projected delivery date or time span of delivery period.
    h. Specific Product “Material Safety Data Sheet” reference.
3. Submittal: Within twenty (20) days after the date of commencement of the Work, submit four (4) copies of an initial product list. Provide a written explanation for omissions of data and for known variations from Contract requirements.
    a. At the Contractor's option, the initial submittal may be limited to product selections and designations that must be established early in the Contract period.
4. Architect's Action: The Architect will respond in writing to Contractor. No response constitutes no objection to listed manufacturers or products but does not constitute a waiver of the requirement that products comply with Contract Documents. The Architect's response will include the following:

a. A list of unacceptable product selections, containing a brief explanation of reasons for this action.

1.06 MATERIAL SAFETY DATA SHEETS MANUAL

A. Within ten (10) days after submission of Product List Schedule and before materials may be delivered to jobsite, submit one (1) or more 8 ½ x 11 paper size three (3) ring binder with the Product List Schedule and Material Safety Data Sheet for each product. Using the Product List Schedule as table of contents arrange Materials Safety Data Sheets in table of contents order.

B. Submit one (1) copy of materials Safety Data Sheet Manual to Clerk of the Works and Architect.

1. Provide one (1) copy of Material Safety Data Sheets for insertion in Manual for products listed on additional Product List Schedules.

C. This requirement is in addition to any obligation the Contractor has to maintain Material Safety Data Sheets at job site or elsewhere.

1.07 QUALITY ASSURANCE

A. Source Limitations: To the fullest extent possible, provide products of the same kind from a single source.

1. When specified products are available only from sources that do not, or cannot, produce a quantity adequate to complete project requirements in a timely manner, consult with the Architect to determine the most important product qualities before proceeding. Qualities may include attributes, such as visual appearance, strength, durability, or compatibility. When a determination has been made, select products from sources producing products that possess these qualities, to the fullest extent possible.

B. Compatibility of Options: When the Contractor is given the option of selecting between two (2) or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.08 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.

1. Schedule delivery to minimize long-term storage at the site.
2. Coordinate delivery with installation time.
3. Deliver products to the site in an undamaged condition in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
5. Store products at the site in a manner that will facilitate inspection.
6. Store and maintain products within acceptable environmental ranges and conditions required by manufacturer’s instructions.

1.09 WORK CONDITIONS / SEQUENCE

A. If sub-contractors find that conditions are not appropriate for them to begin the work of their trade or if they are directed to perform their work out of sequence by the General Contractor or if the General Contractor directs sub-contractors to start and continue regardless of job conditions, the sub-contractor shall so notify the Architect in writing by certified mail immediately.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, new at the time of installation.
   1. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and the intended use and effect.

B. Product Selection Procedures: Product Selection is governed by the Contract Documents and governing regulations; not by previous project experience. Procedures governing product selection include the following:
   1. Where products or manufacturers are specified by name, accompanied by the term "or equal" or "or approved equal", comply with the Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
   2. Non-proprietary Specifications: When Specifications list products or manufacturers that are available and may be incorporated in the Work, they do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
   3. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.
   4. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply with these requirements and are recommended by the manufacturer for the application indicated. General overall performance of a Product is implied where the product is specified for a specific application.
      a. Manufacturer's recommendations may be contained in published product literature or by the manufacturer's certification of performance.
   5. Compliance with Standards, Codes, and Regulations: Where the Specifications only require compliance with an imposed code, standard, or regulation, select a product that complies with the standards, codes, or regulations specified.
   6. Visual Matching: Where Specifications require matching an established Sample, the Architect's decision will be final on whether a proposed product matches satisfactorily.
      a. Where no product available within the specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents concerning "substitutions" for selection of a matching product in another product category, or for non-compliance with specified requirements.

7. Visual Selection: Where specified product requirements include the phrase "... as selected from manufacturer's standard colors, patterns, textures..." or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Architect will select the color, pattern, and texture from the product line selected.

PART 3 - EXECUTION

3.01 INSTALLATION OF PRODUCTS

A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.

1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION

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SECTION 01 74 00

WARRANTIES AND BONDS

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for warranties required by the Contract Documents, including manufacturer’s standard warranties on products and special warranties.
   1. Refer to the General Conditions for terms of the Contractor's special warranty on workmanship and materials.

B. General Closeout requirements and procedures are included in Section 017000 “Project Closeout”.
   1. Specific requirements for warranties on products and installations specified to be warranted are included in the individual Sections of Divisions 2 through 16.
   2. Certifications and other commitments and agreements for continuing services to the Owner are specified elsewhere in the Contract Documents.

C. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

D. Separate Prime Contracts: Each prime contractor is responsible for warranties related to its own contract.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
   2. Section 02 41 13 - Selective Demolition
   3. Section 03 54 13 - Cementitious Underlayment
   4. Section 04 20 00 – Unit Masonry
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
   7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.

8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.04 DEFINITIONS

A. Standard Product Warranties are pre-printed written warranties published by individual manufacturers for products and are specifically endorsed by the manufacturer to the Owner.

B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.05 WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting warranted Work that has failed, remove, and replace construction that has been damaged because of such failure or must be removed and replaced to provide access for correction of warranted construction.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation, as determined by the Architect.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace, or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with the requirements of the Contract Documents.

E. The Owner reserves the right to refuse to accept the Work for the Project where a special warranty, certification or similar commitment on the Work or part of the Work is required, until the Contractor presents evidence that entities required to countersign such commitments are willing to do so.

1.06 SUBMITTALS

A. Submit written warranties to the Architect bound in the Project Closeout Manual as described in Section 017700 – Closeout Procedures. If the Architect's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Architect.

1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Architect within ten (10) days of completion of that designated portion of the Work.

B. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier, or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties, submit a draft to the Architect, for approval prior to final execution.

C. Prepare a written document utilizing the appropriate form, ready for execution by the Contractor, or by the Contractor and subcontractor, supplier, or manufacturer. Submit a draft to the Architect for approval prior to final execution.

1. Refer to individual Sections of Divisions 2 through 16 for specific content requirements and particular requirements for submitting special warranties.

PART 2 – PRODUCTS NOT USED

PART 3 - EXECUTION

3.01 WARRANTIES

A. Schedule: Provide warranties on products and installations as specified in the appropriate Sections of the Specification.

1. When products, equipment, or materials fail and/or continue to be a repetitive source of problems, with no satisfactory resolution (e.g. HVAC Equipment) during the warranty period, the Owner reserves the right to extend the period of the initial warranty period. If no satisfactory resolution can be reached during this resolution period, then the Owner reserves the right to demand for the full replacement of the item in question, including all associated work required to execute this replacement at no cost to the Owner.

END OF SECTION

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SECTION 017700

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections are hereby made a part of this Section.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout including, but not limited to, the following:

1. Inspection procedures.
2. Contractor's monetized punch list.
3. Project Record Document Submittal.
4. Project Closeout Manual Submittal.
5. Final cleaning.

B. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions 2 through 16.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
2. Section 02 41 13 - Selective Demolition
3. Section 03 54 13 - Cementitious Underlayment
4. Section 04 20 00 – Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.

18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.04 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request for which the architect shall review and/or approve.
   1. The contractor shall prepare and submit a monetized punch list. No exceptions will be considered.
   2. In the Application for Payment that coincides with, or first allows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete.
      a. If 100 percent completion cannot be shown, the contractor shall provide his monetized punch list including, but not limited to, the following:
         1) A list of incomplete items.
         2) The value of each incomplete item.
         3) A Reason each item is not complete.
   3. Advise the Owner of pending insurance changeover requirements.
   4. Submit application for reduction of retainage.
   5. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents, as further described below.
   6. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
   7. Submit record drawings, maintenance manuals, damage or settlement surveys, and similar final record information, as further described below.
   8. Deliver tools, spare parts, extra stock, and similar items.
   9. Make final changeover of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of changeover in security provisions.
   10. Complete startup testing of systems and instruction of the Owner's operation and maintenance personnel. Discontinue and remove temporary facilities from the site, along with mockups, construction tools, and similar elements.
   11. Complete final cleanup requirements, including touch-up painting.
   12. Touch-up and otherwise repair and restore, marred, exposed finishes.

B. Inspection Procedures: On receipt of a request for inspection, the Architect will either proceed with inspection or advise the Contractor of unfilled requirements. The Architect will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
   1. The Architect will repeat inspection when requested and assured that the Work has been substantially completed.
   2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.05 FINAL ACCEPTANCE

A. Preliminary procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.
   1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted.
   2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
   3. Submit a certified copy of the Architect's final inspection list of items to be completed or corrected, endorsed, and dated by the Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance and shall be endorsed and dated by the Architect.
   4. Submit consent to surety of final payment.
   5. Submit a final liquidated damages settlement statement.
   6. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Re-inspection Procedure: The Architect will re-inspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except for items whose completion is delayed under circumstances acceptable to the Architect.
   1. Upon completion of re-inspection, the Architect will prepare a certificate of final acceptance. If the Work is incomplete, the Architect will advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
   2. If necessary, the re-inspection will be repeated.

1.06 RECORD DOCUMENTS

A. General: Maintain a complete set of Record Documents at the site. Do not use Record Documents for construction purposes. Provide access to Record Documents for Architect and Owner's reference. Generally, without limitation, Record Documents shall include the following:
   1. Record Drawings: Maintain a clean set of Contract Drawings and shop drawings, updated weekly to show actual installation. Give particular attention to concealed items.
   2. Record Project Manual: Maintain a clean Project Manual, including Addenda, Change Orders, Architect Field Orders, and other modifications, updated weekly to show changes in actual work performed. Give particular attention to substitutions, selection of options, and similar information.
   3. Record Product Data: Maintain one copy of each approved Product Data submittal, updated weekly to show changes from products delivered, work performed, and from manufacturer's recommended installation instructions.
   4. Record Samples: Maintain one copy of each approved Sample submitted.
   5. Record Field Test Reports: Maintain one copy of each Field Test Report.
   6. Daily Progress Reports: Maintain one copy of each Daily Progress Report.

B. Maintenance of Documents and Samples: Store documents and samples in Contractor's field office apart from documents used for construction. Provide files and racks for document storage. Provide locked cabinet or secure storage space for storage of samples. File documents and samples in accordance with CSI format. Maintain documents in clean, dry, legible condition and in good order. Do not use Record Documents for construction purposes. Always make documents and samples available for inspection by Architect.

C. Recording: Label each document "PROJECT RECORD" in neat large, printed letters. Record all information concurrently with the progress of construction. Do not conceal any work until required information is recorded.

D. Drawings: Legibly update all Drawings to record actual construction, including the following:

1. Field changes of dimension and detail.
2. Changes made by Field Order or Change Order.
3. Details not in original Contract Documents.

E. Specifications and Addenda: Legibly mark each Section to record:

1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment installed.
2. Changes made by Field Order or by Change Order.

F. Submittal: At Contract Closeout, deliver Record Documents to Architect. Accompany submittal with transmittal letter in duplicate, indicating the date, Project title and number, Contractor's name and address, title and number of Record Document, and signature of Contractor or his authorized representative.

1.07 PROJECT CLOSEOUT MANUAL

A. General: Prepare and submit Project Closeout Manual as specified in this Section and as approved by the Architect for format. Organize data into suitable sets, bound and indexed using the specification’s Table of Contents as a guide. Mark appropriate identification on front and spine of each binder. Include the following types of information:

1. Contact Persons’ Names
2. Telephone Numbers
3. Pager or Beeper Numbers
4. Cellular Phone Numbers
5. Description of each warranty item covered.
6. Instructions Describing Protocol for Requesting Warranty Service.
7. Emergency Numbers – 911, Fire, Rescue, Police.
8. Utility Company Contacts.

B. Instruct Owner's personnel in use and layout of manual.

C. Format of Data: Prepare data in form of user’s guide-type manual for use by Owner's personnel. Format shall be 8-1/2 in. x 11 in., 20-pound minimum, white, typed pages. Text shall be printed or neatly typewritten. Drawings shall be bound with text, with reinforced punched binder tabs. Fold larger drawings to the size of text pages. Provide flyleaf for each separate section. Provide typed descriptions of each product and piece of major equipment. Provide indexed tabs to divide sections. Provide reference in each section to other binders for actual Operating and Maintenance Data. Coordinate Project Closeout Manual with Operating and Maintenance Data.

1. Binders: Provide commercial quality three-ring binders with durable and cleanable plastic covers, with maximum ring size of three (3) inches. Only use one (1) binder for this manual.
2. Binder Cover: Identify each volume with typed or printed title "PROJECT CLOSEOUT MANUAL". List title of Project, identity of separate structure as applicable, and identity of general subject matter covered in the manual.

D. Submittal of Project Closeout Manual: Submit two copies of preliminary draft of proposed formats and outlines of contents prior to start of Work.
1. The Architect will review the draft and return one copy with comments.
2. Submit one copy of complete data in final form 15 days prior to final inspection or acceptance. Copy will be returned after final inspection or acceptance, with comments.
3. Submit three copies of approved data in final form ten days after final inspection or acceptance.

1.08 OPERATING AND MAINTENANCE DATA

A. General: Prepare and submit Operating and Maintenance Data as specified in this Section and referenced in other pertinent Sections of Specifications. Organize Operating and Maintenance Data into suitable sets, bound and indexed. Mark appropriate identification on front and spine of each binder. Include the following types of information:
1. Emergency instructions.
2. Spare parts list.
3. Copies of warranties.
4. Wiring diagrams.
5. Inspection procedures.

B. Instruct Owner's personnel in maintenance of products and in operation of equipment and systems.

C. Preparation of data shall be done by personnel trained and experienced in maintenance and operation of described products.

D. Format of Data: Prepare data in form of instructional manual for use by Owner's personnel. Format shall be 8-1/2 in. x 11 in., 20-pound minimum, white, typed pages. Text shall be manufacturer's printed data, or neatly typewritten. Drawings shall be bound with text, with reinforced punched binder tabs. Fold larger drawings to the size of text pages. Provide flyleaf for each separate product or each piece of operating equipment. Provide typed description of product and major component parts of equipment. Provide indexed tabs.
1. Binders: Provide commercial quality three-ring binders with durable and cleanable plastic covers, with maximum ring size of two (2) inches. When multiple binders are used, correlate the data into related consistent groupings.
2. Binder Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS". List title of Project, identity of separate structure as applicable, and identity of general subject matter covered in the manual.

E. Content of Manual: Neatly typewritten table of contents for each volume, arranged in systematic order, indicating Contractor name and address, and a list of each product, indexed to content of the volume. Provide a separate list with each product, name, address, and telephone number of subcontractor or installer, and local source of supply for parts and replacement.

1. Provide in each volume a copy of each warranty, bond, and service contract issued.

F. Submittal of Maintenance and Operating Manual: Submit two copies of preliminary draft of proposed formats and outlines of contents prior to start of Work.
   1. The Architect will review the draft and return one copy with comments.
   2. Submit one copy of complete data in final form 15 days prior to final inspection or acceptance. Copy will be returned after final inspection or acceptance, with comments.
   3. Submit three copies of approved data in final form ten days after final inspection or acceptance.

1.09 INSTRUCTION OF OWNER'S PERSONNEL

A. Prior to final inspection or acceptance, fully instruct Owner's designated operating and maintenance personnel in the operation, adjustment and maintenance of products, equipment and systems.

B. Operating and maintenance manual shall constitute the basis of instruction.
   1. Review contents of manual with personnel in full detail to explain all aspects of operation and maintenance.

1.10 WARRANTIES AND BONDS

A. General: Assemble warranties, bonds, and service and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors into the Project Closeout Manual.

B. Refer to Section 01 74 00 – Warranties and Bonds for additional requirements.

1.11 FINAL CLEANING

A. General: General cleaning during construction operations is specified as Work of Section 01 50 00 – Temporary Facilities & Controls.

B. Employ experienced workers or professional cleaners for Final Cleaning. Clean each surface to the condition expected in a normal building cleaning and maintenance program. Comply with manufacturer's instructions and recommendations.

PART 2 – PRODUCTS

2.01 CLEANING MATERIALS

A. General: Provide cleaning materials that will not create hazards to health or property and will not damage surfaces or finishes.

B. Use cleaning materials and methods recommended by the manufacturer of surface to be cleaned.

C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

2.02 FINAL CLEANING

A. Employ skilled workers for final cleaning.

B. Clean and restore general work areas and adjoining surfaces and other work soiled or damaged during installation; replace work damaged beyond successful restoration. Where performance of subsequent work could result in damage to complete unit or element, provide protective covering and other provisions to minimize potential for damage.

C. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight-exposed interior and exterior surfaces.

D. Special Cleaning for Windows: New glass installed as part of this project shall be thoroughly cleaned inside and out by professional window cleaners at the conclusion of all other work and prior substantial completion. All damaged, broken, or scratched items shall be replaced without costs to Owner, as described under the appropriate Trade Section(s).

E. Complete the following cleaning operations prior to requesting inspection for Certification of Substantial Completion:

1. Concrete and masonry shall be cleaned free of all foreign matter. If, in the opinion of the Architect, further cleaning of specific areas is required they shall be scrubbed with water or other cleaning agents. Acid cleaners shall not be used, except as may otherwise specifically be permitted in the trade sections.
2. Metal surfaces, hardware, fixtures, appliances, equipment, and similar items shall be cleaned free of all foreign matter and, if necessary, shall be lightly scrubbed at specific stains with clean water, mild soap, and soft rags, thoroughly rinsed and wiped with clean, soft white rags. Abrasive cleaners shall not be used.
3. Architectural woodwork shall be thoroughly dusted and cleaned of all stains, spots, etc., using methods and cleaning agents, which will not damage the various finishes.
4. Ceramic tile, porcelain, and other surfaces with integral finishes, shall be washed with clean water, mild soap, and soft rags, thoroughly rinsed, and then wiped with clean, soft white rags. Abrasive cleaners shall not be used.
5. Resilient flooring shall be given final cleaning and buffing.
6. Carpeting shall be vacuum cleaned and shall have all spots and stains removed.
7. Painted surfaces shall be cleaned free of all foreign matter, and if necessary, shall be lightly scrubbed at specific stains with clean water, mild soap, and soft rags, thoroughly rinsed, and wiped with clean, soft white rags.
8. All advertising matter and temporary instructional material shall be removed from exposed surfaces throughout.
9. Remove labels that are not permanent.
10. Clean interior and exterior finishes to a clean, dust-free condition. Remove stains, films, and similar foreign substances.
11. Vacuum and mop hard floor surfaces.
12. Clean plumbing fixtures to a sanitary condition.
13. Clean site areas of rubbish, litter, and other foreign substances.
14. Sweep paved areas broom clean, rake ground surfaces clean.

F. Before final completion and Owner-occupancy, inspect sight-exposed interior and exterior surfaces and work areas to verify that Work is clean.

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SECTION 02 28 20

ASBESTOS REMEDIATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 1 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK

A. The Work of this Section shall include, but not be limited to, furnishing and installation of the following:

1. The General Contractor shall retain the services of a Massachusetts licensed asbestos abatement contractor to perform all related work.
2. All labor, material, equipment, and services specified herein or reasonably necessary for and incidental to removal and legal disposal of Asbestos Containing Materials (ACM).
3. The complete isolation of the Work area for the duration of the Work so as to prevent asbestos contaminated dust or debris from passing beyond the isolated areas, removal, and disposal of ACM.
4. A lump sum bid for all required services included in Part 3. Unit prices included at the end of this Section shall be part of this bid subject to addition and deductions to the lump sum bid.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which effect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
2. Section 02 41 16 – Building Demolition

1.04 POTENTIAL ASBESTOS HAZARDS

A. The disturbance or dislocation of ACM may cause asbestos fibers to be released into the building's atmosphere, thereby creating a potential health hazard to Workers, and building occupants. Apprise all Workers, supervisory personnel, subcontractors, and consultants who will be at the job site of the seriousness of the hazard and of proper Work procedures, which must be followed.

B. Where in the performance of the Work, Workers, supervisory personnel, subcontractors, or consultants may encounter, disturb, or otherwise function in the immediate vicinity of any identified ACM, take appropriate continuous measures as necessary to protect all building occupants from the potential hazard of exposure to airborne asbestos. Such measures shall include

the procedures and methods described herein, and compliance with regulations of applicable federal, state, and local agencies.

C. If the Contractor failed to comply with the requirements of the specifications, the Owner's Representative (Project Monitor) may present a written stop of Work order. The Contractor must immediately and automatically stop all Work until authorized in writing by the Project Monitor to commence Work. All costs related to delays shall be at the Contractor's expense.

1.05 DEFINITIONS

A. Abatement: Procedures to control fiber release from ACM. Includes encapsulation, enclosure, and removal.

B. Air Monitoring: The process of measuring the fiber content of a specific volume of air in a stated period of time.

C. Asbestos: The name given to a number of naturally occurring hydrated mineral silicates that possess a unique crystalline structure are incombustible and are separable into fibers. Asbestos includes Chrysotile, Crocidolite, Amosite, Anthophyllite, and Actinolite.

D. ACM: Any material containing 1% or more by weight of asbestos of any type or mixture of types. State laws may vary in their definition of asbestos containing material.

E. Authorized Visitor: The Owner, the Designer, or a representative of any regulatory or other agency having authority over the project.

F. Designer: Commonwealth of Massachusetts licensed Designer Ammar Dieb, Universal Environmental Consultants (AD-900326).

G. Enclosure: All herein specified procedures necessary to complete enclosure of all ACM behind airtight, impermeable, permanent barriers.

H. Friable Asbestos Material: Material that contains more than one percent asbestos by weight and that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.

I. Removal: All herein specified procedures necessary to strip all ACM from the designated areas and to dispose of these materials at an acceptable site.

J. Visible Emissions: Any emissions containing particulate asbestos material that are visually detectable without the aid of instruments. This does not include condensed uncombined water vapor.

1.06 CONTRACTOR USE OF PREMISES

A. Do not unreasonably encumber the site with materials or equipment. Confine stockpiling of materials and location of storage sheds to the areas indicated. If additional storage is necessary, obtain and pay for such storage off site.

1.07 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

A. Provide a full time Site Supervisor with all appropriate state licenses, experienced in administration and supervision of asbestos abatement projects including Work practices, protective measures for building and personnel, disposal procedures, etc. This person is the Competent Person as required by 29CFR 1926 for the Contractor and is the Contractor's representative responsible for compliance with all applicable federal, state, and local regulations. This person must have completed a course at an EPA Training Center or equivalent certificate

course in asbestos abatement procedures, have had a minimum of two years on the job training and meet any additional requirements set forth in 29 CFR 1926 for a Competent Person. The Site Supervisor must be certified by the Commonwealth.

B. Contractor shall provide proof of such certification to the Designer not less than 10 days (Document Submission Date) prior to commencing any Work. The accredited Supervisor must be at the Work site at all times while Work is in progress.

1.08 SPECIAL REPORTS

A. Except as otherwise indicated, submit special reports directly to the Project Monitor within one day of occurrence requiring special report, with copies to all others affected by the occurrence.

B. When an event of unusual and significant nature occurs at the site (examples: failure of negative pressure system, rupture of temporary enclosures, unauthorized entry into work areas), prepare and submit a special report listing date and time of event, chain of events, response by Contractor's personnel, evaluation of results, and similar pertinent information. When such events are known or predictable in advance, advise the Project Monitor in advance at earliest possible date.

C. Prepare and submit special reports of significant accidents, at the site and anywhere else work is in progress related to this project. Record and document data and actions; comply with industry standards. For this purpose, a significant accident is defined to include events where personal injury is sustained, or property loss of substance is sustained, or where the event posed a significant threat of loss.

1.09 PERMITS AND NOTIFICATIONS

A. Secure all permits related to asbestos removal, hauling, and disposition and provide timely notification as may be required by federal, state, and local authorities including the Health department. Notify the Regional Office of the United States Environmental Protection Agency (USEPA) in accordance with 40 CFR 61.22 (d)(1) and provide copies of the notification to the Designer and the State Environmental Regulatory Agency 10 Working days prior to commencement of the Work.

B. No later than the Document Submission Date, notify the local fire and police department, in writing, of proposed asbestos abatement Work. Advice the fire department of the nature of the asbestos abatement Work, and the necessity that all firefighting personnel who may enter the Work site in the case of fire wear self-contained breathing apparatus. Provide one copy of the notices to the Designer prior to commencing the project.

C. Submit proof to the Designer that all required permits, site location, and arrangements for transport and disposal of ACM have been obtained.

1.10 RESPIRATORY PROGRAM

A. Establish a respirator program as required by ANSI Z88.2 and 29 CFR 1926.1101 (h), 1926.l03, and l9l0.l34.

1.11 CODES AND REGULATIONS

A. Except to the extent that more explicit or more stringent requirements are written directly into the contract documents, all applicable codes, regulations, and standards have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the contract documents, or as if published copies are bound herewith.

B. The Contractor shall assume full responsibility and liability for the compliance with all applicable federal, state, and local regulations pertaining to Work practices, hauling, disposal, and protection of Workers, visitors to the site, and persons occupying areas adjacent to the site. The Contractor is responsible for providing medical examinations and maintaining medical records or personnel as required by the applicable federal, state, and local regulations. The Contractor shall hold the Owner, Designer and, Owner's Representative harmless for failure to comply with any applicable Work, hauling, disposal, safety, health, or other regulation on the part of himself, his employees, or his subcontractors.

1.12 REFERENCE STANDARDS

A. Unless otherwise indicated, all referenced standards shall be the latest edition available at the time of bidding. Any requirements of these specifications shall in no way invalidate the minimum requirements of the referenced standards. Comply with the provisions of the following codes and standards, except as otherwise shown or specified. Where conflict exists, the more stringent requirements shall apply.

B. U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA) requirements, which govern asbestos abatement work or hauling and disposal of asbestos waste materials.
SUBMITTALS

C. Submit all required licenses and certification required under MGLC.149 S 44D and 453 CMR 6.00.

D. Submit a copy of the written respirator program.

E. Submit manufacturer's certification that vacuums, ventilation equipment, and other equipment required to contain airborne asbestos fibers conform to ANSI Z9.2. Manufacturer's brochures without certifications are not acceptable.

F. Submit a detailed plan of the Work procedures to be used in the removal of materials containing asbestos. Such plan shall include location of asbestos control areas, decontamination units, layout of decontamination units, location of access routes to asbestos control areas, interface of trades involved in the construction, sequencing of asbestos related Work, disposal plan, type of wetting agent and asbestos sealer to be used, air monitoring, and a detailed description of the method to be employed in order to control pollution.

G. Submit a plan for emergency action.

H. Submit the name, address, and telephone number of the testing laboratory selected for the personal air monitoring of airborne concentrations of asbestos fibers to meet Federal and State OSHA regulations, including Short Term Exposure Limit sampling (STEL). The laboratory must have satisfactorily completed the NIST Proficiency Analytical Testing (PAT) Program and be licensed by the appropriate state agency. Submit the certification that persons counting the samples have been judged proficient by successful completion of the NIOSH 582 course (or

equivalent) or be listed in the AIHA Asbestos Analysts Registry (AAR). All OSHA required air monitoring should be done in accordance with the most current NIOSH 7400 method.

I. Submit the design of the negative pressure system.

1. Number of negative air machines required and the calculations necessary to determine the number of machines.
2. Description of projected airflow within the Work area and methods required providing adequate airflow in all portions of the Work area.
3. Manufacturers product data and certifications for the machines to be used.
4. Location of machines in the Work area.
5. Location of pressure differential measurement equipment.
6. Manufacturers product data on equipment used to monitor pressure differential.

J. Submit for approval the form of security and safety log, which will be maintained on the project.

K. Submit written evidence that the landfill to be used for disposal of asbestos is approved for disposal of asbestos by the Department of Environmental Protection.

L. Submit proof that training requirements as specified in 29CFR 1926.1101 (k) (3) and by appropriate state agencies has been complied with.

M. Submit a description of the plans for construction of decontamination enclosure systems and for isolation of the Work areas in compliance with this specification and applicable regulations.

N. Submit a schedule including Work dates, shift time, number of employees, dates of start and completion of all Work, asbestos abatement, inspection and clearance monitoring, each phase of refinishing, and final inspections). Schedule shall be updated with each partial payment request.

O. Submit copies of all notifications.

P. Submit copy of asbestos license.

1.13 REPORTING

A. Maintain on site a daily log documenting the dates and time of the following items, as well as other significant events:

1. Minutes of meetings: purpose, attendees, and brief discussion
2. Visitations: authorized and unauthorized
3. Personnel: by name, entering and leaving the Work area
4. Special or unusual events

B. Documentation with confirmation signature of Owner's on-site representative of the following:

1. Inspection of Work area preparation prior to start of removal and daily thereafter.
2. Removal of waste materials from Work area and transport and disposal at approved site.

C. Provide two bound copies of this log to the Owner's Representative with the application for final payment.

D. 15% of the Contract will be held until original copies of the Waste Shipment Records are submitted.

1.14 AIR MONITORING

A. Throughout the entire removal and cleaning operations, air monitoring will be conducted to ensure that the Contractor is complying with the EPA and OSHA regulations and any applicable state and local government regulations. The Owner will provide a Project Monitor (Universal Environmental Consultants) to take air samples at the job site at no cost to the Contractor.

B. The purpose of the Owner's air monitoring will be to detect faults in the Work area isolation such as:

1. Contamination of the building outside of the Work area with airborne asbestos fibers,
2. Failure of filtration or rupture in the negative pressure system,
3. Contamination of the exterior of the building with airborne asbestos fibers.
4. Should any of the above occur, the Contractor should immediately cease asbestos activities until the fault is corrected. Work shall not recommence until authorized by the Designer.

1.15 AIRBORNE FIBER COUNTS

A. If any air sample taken outside of the work area exceeds the base line established below, immediately and automatically stop all work. If this air sample was taken inside the building and outside of critical barriers around the work area, immediately erect new critical barriers to isolate the affected area from the balance of the building. Erect Critical Barriers at the next existing structural isolation of the involved space (e.g., wall, ceiling, and floor).

1. Decontaminate the affected area in accordance with the procedures outlined in DECONTAMINATION OF WORK AREA.
2. Respiratory protection shall be worn in affected area.
3. Leave critical barriers in place until completion of work and ensure that the operation of the negative pressure system in the work area results in a flow of air from the balance of the building into the affected area.
4. After certification of visual inspection in the work area, remove critical barriers separating the work area from the affected area. Final air samples will be taken within the entire area as set forth in WORK AREA CLEARANCE.
5. A final inspection after removal of poly shall be completed by the Contractor's Supervisor and the Project Monitor.

B. The following procedure will be used to resolve any disputes regarding fiber types when a project has been stopped due to excessive airborne fiber counts. "Airborne Fibers" referred to above include all fibers regardless of composition as counted in the NIOSH 7400 Procedure. If work has stopped due to high airborne fiber counts, air samples will be secured in the same area by the Project Monitor for analysis by electron microscopy. "Airborne Fibers" counted in samples analyzed by Scanning or Transmission Electron microscopy shall be only asbestos fibers, but of any diameter and length. Subsequent to analysis by electron microscopy the number of "Airborne Fibers" shall be determined by multiplying the number of fibers, regardless of composition, counted by the NIOSH 7400 procedure by a number equal to asbestos fibers counted divided by all fibers counted in the electron microscopy analysis.

C. If Electron microscopy is used to arrive at the basis for determining "Airborne Fiber" counts in accordance with the above paragraph, and if the average of airborne asbestos fibers in all samples taken outside the work area exceeds the base line, then the cost of such analysis will be borne by the Contractor, at no additional cost to the Owner.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Plastic Sheet: 9-mil minimum thickness, unless otherwise specified, in sizes to minimize the frequency of joints.

B. ape: Capable of sealing joints of adjacent sheets of plastic and for attachment of plastic sheet to finished or unfinished surfaces of dissimilar materials and capable of adhering under dry and wet conditions, including use of amended water. Provide tape, which minimizes damage to surface, finishes.

C. Cleaning Materials: Use materials recommended by manufacturer of surface to be cleaned. Use cleaning materials only on surfaces recommended by the cleaning material manufacturer.

D. Impermeable Containers: Suitable to receive and retain any asbestos containing or contaminated materials until disposal at an approved site. Containers must be both air and watertight.

E. Provide metal or fiber drums with tightly fitting lids and double thickness 6 mil plastic bags capable of being sealed and sized to fit within the drums.

2.02 EQUIPMENT

A. Supply the required number of asbestos air filtration units to the site in accordance with these specifications. Each unit shall include the following:

1. Cabinet: Constructed of steel or other durable materials able to withstand damage from rough handling and transportation. Cabinet shall be factory sealed to prevent asbestos containing dust from being released during use, transport, or maintenance. Access to and replacement of all air filters shall be from intake end. Unit shall be mounted on casters or wheels.
2. Fans: Rate capacity of fan according to usable air moving capacity under actual operating conditions. Use centrifugal type fan.
3. HEPA Filters: The final filter shall be the HEPA type. The filter media (folded into closely pleated panels) must be completely sealed on all edges with a structurally rigid frame. A continuous rubber gasket shall be located between the filter and the filter housing to form a tight seal.
4. Each filter shall be individually tested and certified by the manufacturer to have an efficiency of not less than 99.97 percent when challenged with 0.3 um dioctylphthalate (DOP) particles. Testing shall be in accordance with Military Standard Number 282 and Army Instruction Manual l36-300-l75A. Each filter shall bear a UL 586 label to indicate ability to perform under specified conditions. Each filter shall be marked with the name of the manufacturer, serial number, airflow rating, efficiency, and resistance.
5. Prefilters: Prefilters, which protect the final filter by removing the larger particles, are required to prolong the operating life of the HEPA filter. Two stages of prefiltration are required. The first stage prefilter shall be a low efficiency type (e.g., for particles l0 um and larger). The second stage (or intermediate) filter shall have a medium efficiency (e.g., effective for particles down to 5 um). Prefilters and intermediate filters shall be installed either on or in the intake grid of the unit and held in place with special housings or clamps.

6. Instrumentation: Each unit shall be equipped with a Magnehelic gauge or manometer to measure the pressure drop across filters and indicate when filters have become loaded and need to be changed. A table indicating the useable air handling capacity for various static pressure readings on the Magnahelic gauge shall be affixed near the gauge for reference, or the Magnahelic reading indicating at what point the filters should be changed, noting Cubic Feet per Minute (CFM) air delivery at that point. Provide units equipped with an elapsed time meter to show the total accumulated hours of operation.

7. Safety and Warning Devices: The unit shall have an electrical (or mechanical) lockout to prevent fan from operating without an HEPA filter. Units shall be equipped with automatic shutdown systems to stop fan in the event of a major rupture in the HEPA filter or blocked air discharge. Indicator lights are required to indicate normal operation, too high a pressure drop across the filters (i.e., filter overloading), and too low of a pressure drop (i.e., major rupture in HEPA filter or obstructed discharge).
8. Electrical Components: Provide electrical components, which are approved by the National Electrical Manufacturers Association (NEMA), and Underwriter's Laboratories (UL). Each unit shall be equipped with overload protection sized for the equipment. The motor, fan, fan housing, and cabinet shall be grounded.

B. Provide and display danger signs at each location where airborne concentrations of asbestos fibers may be in excess of 0.0l fibers/cc. Post signs at such a distance from such a location so that an employee may read the signs and take necessary protective steps before entering the area marked by the signs. Post signs at all approaches to Work areas or areas containing excessive concentrations of airborne asbestos fibers.

C. The sign shall also contain a pictorial representation of possible danger or hazard, such as a skull and cross bone, or other suitable warning as approved by the Designer. Sign shall meet the requirements of 29CFR 1926.200.

D. A sample of the signs to be used shall be submitted to the Designer for approval prior to beginning Work area preparation.

2.03 PERSONNEL DECONTAMINATION UNIT

A. Prior to any asbestos abatement work, including placement of plastic on walls that will contact or disturb asbestos containing surfaces, or removal of light fixtures or any items on asbestos containing surfaces, construct a Personnel Decontamination Unit consisting of a serial arrangement of connected rooms or spaces, Changing Room, Shower Room, and Equipment Room. Require all persons without exception to pass through this decontamination unit for entry into and exiting from the work area for any purpose. Do not remove equipment or materials through Personnel Decontamination Unit. Provide temporary lighting within decontamination units.

B. Build suitable framing or use existing rooms, with the Project Monitor's written approval, connected with framed in tunnels if necessary; line with 6 mil plastic; seal with tape at all lap joints in the plastic for all enclosures and decontamination enclosure system rooms. Decontamination units and access tunnels constructed outside must be constructed with tops made of 5/8" plywood or approved equal. In all cases, access between contaminated and uncontaminated rooms or areas shall be through an airlock. In all cases, access between any two rooms within the decontamination enclosure systems shall be through a curtained doorway.

C. Provide a changing (clean) room for the purpose of changing into protective clothing. Construct using polyethylene sheeting, at least 6-mil in thickness, to provide an airtight seal between the Clean Room and the rest of the building. Locate so that access to work area from Clean Room is through Shower Room. Separate Clean Room from the building by a sheet polyethylene flapped doorway.

D. Require workers to remove all street clothes in this room, dress in clean disposable coveralls, and don respiratory protection equipment. Do not allow asbestos contaminated items to enter this room. Require workers to enter this room either from outside the structure dressed in street clothes, or naked from the showers.

E. An existing room may be utilized as the changing room if it is suitably located and of a configuration whereby workmen may enter the Clean Room directly from the Shower Room. Protect all surfaces of room with sheet plastic. Authorization for this must be obtained from the Project Monitor in writing prior to start of construction.

1. Maintain floor of changing room dry and clean at all times. Do not allow overflow water from shower to wet floor in Changing Room.
2. Damp-wipe all surfaces twice after each shift change with a disinfectant solution.
3. Provide a continuously adequate supply of disposable bath towels.
4. Provide posted information for all emergency phone numbers and procedures.
5. Provide one storage locker per employee.
6. Provide all other components indicated on the contract drawings.

F. Provide a completely water tight operational shower to be used for transit by cleanly dressed workers heading for the work area from the changing room, or for showering by workers headed out of the Work Area after undressing in the Equipment Room.

G. Construct room by providing a shower pan and 2 shower walls in a configuration that will cause water running down walls to drip into pan. Install a freely draining wooden floor in shower pan at elevation of top of pan.

1. Separate this room from the rest of the building with airtight walls fabricated of 6-mil polyethylene.
2. Separate this room from the Clean and Equipment Rooms with airtight walls fabricated of 6-mil polyethylene.
3. Provide showerhead and controls.
4. Provide temporary extensions of existing hot and cold water and drainage, as necessary for a complete and operable shower.
5. Provide a soap dish and a continuously adequate supply of soap and maintain in sanitary condition.
6. Arrange so that water from showering does not splash into the Clean or Equipment Rooms.
7. Arrange water shut off and drain pump operation controls so that a single individual can shower without assistance from either inside or outside of the work area.
8. Provide flexible hose shower head Pump wastewater to drain and provide 20 micron and 5-micron wastewater filters in line to drain or waste water storage. Locate filter hose inside shower unit so that water lost during filter changes is caught by shower pan and pumped to exterior filtering system.

H. Provide equipment room for contaminated area; work equipment; footwear and additional

contaminated work clothing are to be left here. This is a change and transit area for workers. Separate this room from the work area by a 6-mil polyethylene flap doorway.

1. Separate this room from the rest of the building with airtight walls fabricated of 6-mil polyethylene.
2. Separate this room from the Shower Room and work area with airtight walls fabricated of 6-mil polyethylene.

I. Separate work area from the Equipment Room by polyethylene barriers. If the airborne asbestos level in the work area is expected to be high, add an intermediate cleaning space between the Equipment room and the work area. Damp-wipe clean all surfaces after each shift change.

2.04 EQUIPMENT DECONTAMINATION UNITS

A. In areas with only one access, it may be impossible to utilize a separate Equipment Decontaminate Unit. In this case, all equipment and waste materials will exit through the Personnel Decontamination Chambers.

B. When two accesses to the work area are available, provide an Equipment Decontamination Unit consisting of a serial arrangement of rooms, Clean Room, Holding Room, Wash Room for removal of equipment and material from work area. Do not allow personnel to enter or exit work area through Equipment Decontamination Unit.

C. Provide an enclosed shower unit located in work area just outside Wash Room as an equipment, bag, and container cleaning station.

D. Provide Wash Room for cleaning of bagged or contained asbestos containing waste materials passed from the work area. Construct Wash Room of 2 by 4-inch (minimum) wood framing and polyethylene sheeting, at least 6-mil in thickness and located so that packaged materials, after being wiped clean can be passed to the Holding Room. Separate this room from the work area by flaps of 6 mil polyethylene sheeting, or rigid self-closing doors.

E. Provide Holding Room as a drop location for bagged ACM passed from the Wash Room. Construct Holding Room of 2 by 4-inch (minimum) wood framing and polyethylene sheeting, at least 6-mil in thickness and located so that bagged materials cannot be passed from the Wash Room through the Holding Room to the Clean Room.

F. Provide Clean Room to isolate the Holding Room from the building exterior. Construct Clean Room of 2 by 4-inch (minimum) wood framing and polyethylene sheeting, at least 6-mil in thickness and locate to provide access to the Holding Room from the building exterior. Separate this room from the exterior by flaps of 6 mil polyethylene sheeting, or rigid self-closing doors.

2.05 PERESONNEL PROTECTION

A. Prior to commencement of work, the workers shall be instructed in, and shall be knowledgeable of, the hazards of asbestos exposure; use and fitting of respirators; protective dress; use of showers; entry and exit from work areas, and all aspects of work procedures and protective measures.

B. It is the responsibility of the Contractor to assure that all personnel entering the work area wear approved respirator and protective clothing

C. All asbestos abatement workers shall receive training and shall be accredited as required by 40 CFR 763.90(g). Training and accreditation shall be in accordance with 40 CFR 763, Appendix C to Subpart E. Training shall also be provided to meet the requirements of OSHA Regulations

contained in 29 CFR 1926.

D. Prior to the start of work, the Contractor shall provide medical examinations for all employees in accordance with 29CFR 1926.1101 (m). All employees hired by the Contractor after start of work shall have medical examinations in accordance with this paragraph before being put to work.

E. Maintain complete and accurate records of employee's medical examinations, during employment, for a period of 30 years after termination of employment and make records of the

required medical examinations available for inspection and copying to: The Assistant Secretary of Labor for Occupational Safety and Health, the Director of The National Institute for Occupation Safety and Health (NIOSH), authorized representatives of either of them, and an employee's physician upon the request of the employee or former employee.

F. Provide personnel exposed to airborne concentrations of asbestos fibers with fire retardant disposable protective whole-body clothing, head covering, gloves, and foot coverings. Provide gloves to protect hands. Make sleeves secure at the wrists and make foot coverings secure at the ankles by the use of tape. Contractor shall require and monitor the use of complete protective clothing. A competent person designated by the contractor in accordance with 29CFR 1926.1101 shall periodically examine protective clothing worn by employees in the work area for rips or tears. When rips or tears are detected, they shall be immediately mended or replaced.

G. Provide goggles to personnel engaged in asbestos operations when the use of a full-face respirator is not required.

H. Provide authorized visitors with suitable protective clothing, headgear, eye protection and footwear, whenever they are required to enter the work area, to a maximum of 3 changes for 3 visitors per day. One of the sets of protective clothing must be available for full-time use by the Project Monitors.

I. Provide all persons with personally issued and marked respiratory equipment approved by NIOSH and OSHA. The appropriate respiratory protection will be selected according to the most recent Massachusetts regulations.

J. Once all visible asbestos material has been removed during decontamination, cartridge type respirators will be allowed during the final cleanup, provided the measured airborne concentrations do not exceed 0.1 fibers per cubic centimeter. Where respirators with disposable filters are employed, provide sufficient filters for replacement as required by the worker or applicable regulation.

K. If the permissible respirators fail to provide sufficient protection against volatility emitted by any sealant used, the services of a qualified Project Monitor will be procured, at the Contractor's expense, to determine proper respiratory protection. The Owner will not be liable for the cost of increased respiratory protection.

L. Select respirators from those approved by the Mine Safety and Health Administration (MSHA), Department of Labor, or the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services. All personnel wearing negative pressure respirators shall have respirator fit tests within the last six months and signed statements shall be available.

PART 3 – EXECUTION

3.01 SCOPE OF WORK

A. The project monitor(s) will record daily all quantities removed. The asbestos contractor will be required to sign UEC logs. At the completion of the total Project, should actual quantities removed (listed in UEC logs) be determined to be more, or less, than as listed below, a Change Order increase, or decrease (credit) will be issued based on Unit Prices included at the end of this Section.

B. The scope of work is limited abatement only related to elevators and sprinkler system projects.

Location	Type of Material	Estimated Quantity
Challenge and Reach Academy:		
	Pipe and Hard Joint Insulation	150 LF
	Interior Doors	4 Total
	Exterior Doors	4 Total
Gerald Creamer Center:		
	Interior Doors	10 Total
	Pipe and Hard Joint Insulation	100 LF
	12” x 12” Vinyl Floor Tile	100 SF
Lincoln School:		
	9” x 9” Vinyl Floor Tile	250 SF
	Pipe Insulation	250 LF
	Paper under Hardwood Flooring	100 SF

Thorndyke Road School:

Interior Doors	10 Total
9” x 9” Vinyl Floor Tile/Mastic	500 SF
Pipe Insulation	250 LF
Transite Wall Panels	450 SF
Exterior Windows	Refer to Drawings

M. Specific Notes:

1. It is the Asbestos Contractor's responsibility to inspect the site and confirm condition and quantities prior to the submission of his/her bid package. It is also the Asbestos Contractor’s responsibility to review the demolition drawings, notes, and phasing configurations. The contractor must include in his/her bid the entire scope of work listed above. The Contractor must agree and accept all unit prices listed at the end of this section. Means and methods of removal will be at the discretion of the contractor with prior approval. Perform all work at no additional cost to the owner.
2. In all areas where ACM pipe and hard joint insulation must be removed, ACM debris is included in the scope of work and has to be removed and disposed of as ACM at no extra cost to the Owner.
3. Remove and dispose as ACM of ACM pipe and hard joint insulation found in the building and ACM that might be found in concealed and hidden locations including all ACM debris that might be found.
4. Remove and dispose as ACM of flooring materials needed to perform the work. Refer to drawings.
5. Remove and properly dispose of interior doors. Caulking (framing/glazing) was found to contain asbestos and assumed to contain >1ppm of PCB’s.
6. The Contractor shall make spot demolition in all ceilings including but not limited to ceiling tiles, grids, plaster, and other related structures to access ACM found above ceilings. ACM debris was found on top of the ceiling. No add or deduct for this line item.
7. The Contractor shall make spot demolition in walls to uncover hidden ACM that may be found prior to the GC demolition activities. The asbestos contractor shall perform needed demolition to remove all ACM. No add or deduct for this line item.
8. Remove and dispose of ACM transite panels.
9. Remove and properly dispose of window wall system. Caulking was found to contain asbestos and assumed to contain >1ppm of PCB’s.

3.02 JOB CONDITIONS

A. Do not commence asbestos abatement Work until:

1. Arrangements have been made for disposal of waste at an acceptable site. Submittal must be made no later than the Document Submission Date.
2. Arrangements have been made for containing and disposal of wastewater resulting from wet stripping or filtering through a 5-micron filter.
3. Work areas and decontamination enclosure systems and parts of the building required to remain in use are effectively segregated.

4. Tools, equipment, and material waste receptors are on hand.
5. Arrangements have been made for building security.
6. All other preparatory steps have been taken and applicable notices posted, and permits obtained.
7. Pre-clean all areas prior to abatement.
8. Clean all routs used to transport ACM.

B. The contractor is required to set up and test the emergency generator in the presence of the Project Monitor.

C. All materials resulting from demolition Work, except as specified otherwise, shall become the property of the Contractor, and shall be disposed of as specified herein.

3.03 INSPECTION AND PREPARATION

A. Examine the areas and conditions under which asbestos will be abated and notify the Designer in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in an acceptable manner.

B. Before any Work commences, post danger signs in and around the Work Area to comply with 29-CFR 1926.1101 (k)(l) as required by federal and state regulations, and as specified herein.

C. Pre-clean each area prior to setting up containment and remove all visible ACBM debris.

D. Clean all routes used to transport the ACM bags from the abated areas.

E. Asbestos abatement activities shall be performed using the glovebag method, mini-containment or full containment depending on each scope of work. Type of enclosures will be determined by the contractor and the on-site project monitor at no additional cost to the owner.

3.04 WORK PROCEDURE

A. Perform asbestos related Work in accordance with 29CFR 1926.1101 and as specified herein. Use wet removal procedures. Personnel shall wear and utilize protective clothing and equipment as specified herein. Eating, smoking, or drinking shall not be permitted in the asbestos control area. Removal of lights and other objects in contact with asbestos containing materials is considered as asbestos abatement activities. Thus, individuals involved in such activities must meet all requirements of federal and state regulations for asbestos abatement Workers, including training and medical examinations. Provide and post, in the Equipment Room and the Clean Room, the decontamination and Work procedures to be followed by Workers, as described hereinafter.

B. Each Worker and authorized visitor shall, upon entering the job site, remove street clothes in the Clean Change Room and put on a respirator and clean protective clothing before entering the equipment room or the Work area. All Workers shall remove gross contamination before leaving the Work area. All clothing (coveralls, head covers, boots, etc.) shall be removed and properly disposed of before leaving equipment room. Naked, with the exception of their respirators, the Workers shall proceed to the Shower Room. Under the shower, respirators will be removed and cleaned. Cleaned respirators will be placed in suitable clean plastic bags and carried by employees to Clean Room. Soap, towels, etc., shall be furnished by the Contractor. The Contractor shall maintain proper sanitary conditions. The contractor's designated competent person shall insure that these practices are being adhered to.

C. Following showering and drying off, each Worker and authorized visitor shall dispose of towels as contaminated waste and proceed directly to the Clean Change Room and dress in clean clothes at the end of each day's Work, or before eating, smoking, or drinking. Before re-entering the Work area from the Clean Change Room, each Worker and authorized visitor shall put on the applicable respirator and shall dress in clean protective clothing. Contaminated Work footwear shall be stored in the equipment room when not in use in the Work area. Upon completion of asbestos abatement, dispose of footwear as contaminated waste.

D. Contaminated Work footwear shall be stored in the equipment room when not in use in the Work area. Upon completion of asbestos abatement, dispose of footwear as contaminated waste or double bag for use at next site.

E. Workers removing waste containers from the Equipment Decontamination Enclosure shall enter the holding area from outside wearing a respirator and dressed in clean coveralls. No Worker shall use this system as a means to leave or enter the washroom or the Work area.

F. Workers shall not eat, drink, smoke, or chew gum or tobacco in asbestos abatement Work areas.

G. Workers shall be fully protected with respirators and protective clothing immediately prior to the first disturbance of asbestos containing or contaminated materials and until final cleanup is completed. This includes the removal of any equipment in contact with ACM such as lights, HVAC grills, etc.

3.05 PREPARATIONN OF THE WORK AREA

A. Seal off the Work area by sealing large openings such as open doors, elevator doors, and passageways with a critical barrier. The critical barrier shall constitute the outermost boundary of the asbestos abatement project Work area. Plastic sheeting on open framing is not a suitable critical barrier. Critical barriers may be erected of a suitable solid construction material such as plywood, sheetrock, gypsum board, or other related materials.

B. Prior to any asbestos abatement clean the areas using HEPA filtered vacuum equipment and wet cleaning methods as appropriate. Methods that raise dust, such as dry seeping or vacuuming with equipment not equipped with HEPA filters will not be permitted. Dispose of all cloths which are used for cleaning as contaminated waste.

C. Shut down electric power. Provide temporary power and lighting and ensure safe installation of temporary power sources and equipment per applicable electrical code requirements. Provide 24-volt safety lighting and provide ground-fault interrupter circuits as power source for lights and electrical equipment.

D. Seal off all openings, including but not limited to corridors, doorways, windows, skylights, ducts, grills, diffusers, and any other penetrations of the Work areas, with 6-mil plastic sheeting and sealed with tape.

E. Maintain emergency and fire exits from the Work areas, or establish alternative exits satisfactory to the local fire officials. Coordinate project with local fire and police departments, and Owner's Representative.

F. Pre-clean non-removable furniture, book shelving, equipment, heat fans, fire alarms, pipes, ductwork, wires and conduits, lockers, skylights, speakers, and other fixed objects within the proposed Work areas, using HEPA filtered vacuum equipment and wet cleaning methods as appropriate prior to abatement activities, and enclose with minimum 6 mil plastic sheeting sealed with tape.

3.06 MAINTENANCE OF ENCLOSURE SYSTEMS

A. Ensure that barriers and plastic linings are effectively sealed and taped. Repair damaged barriers and remedy defects immediately upon discovery. Visually inspect enclosures at the beginning of each Work period.

B. Use smoke methods to test effectiveness of barriers when directed by the Project Monitor.

3.07 CONTROL ACCESS

A. Permit access to the work area only through the Decontamination Unit. All other means of access shall be closed off and sealed and warning signs displayed on the clean side of the sealed access.

B. Large openings such as open doorways and passageways shall be sealed as a critical barrier. The critical barrier shall constitute the outmost boundary of the asbestos abatement project work area.

C. Where the area adjacent to the work area is accessible to the public, construct a solid barrier on the public side of the sheeting to protect the sheeting. Construct barrier with nominal 2 by 4-inch (minimum) wood or metal studs l6 inches on centers, securely anchored to prevent movement, covered with minimum l/4-inch-thick hardboard, l/2-inch gypsum wall board, or l/2-inch plywood.

D. Plastic sheeting on open framing is not a suitable critical barrier. All cracks, seams, and openings in critical barriers shall be caulked or otherwise sealed, so as to prevent the movement of asbestos fibers out of the work area.

3.08 ISOLATION OF WORK AREA

A. Completely separate the work area from other portions of the building, and the outside by sheet plastic barriers at least 6 mil in thickness, or by sealing with duct tape.

B. Individually seal all ventilation openings (supply and exhaust), lighting fixtures, clocks, doorways, windows, convectors and speakers, and other openings into the work area with duct tape alone or with polyethylene sheeting at least 6-mil in thickness, taped securely in place with duct tape. Maintain seal until all work including work area decontamination is completed. All lighting fixtures shall have had power shut off.

3.09 NEGATIVE PRESSURE

A. Establish negative pressure in the work area by installation of High Efficiency Particulate Air (HEPA) filter air-purifying devices. Comply with ANSI Z9.2, Local Exhaust Ventilation Requirements. Maintain system in operation 24 hours per day until decontamination of the work area is completed and area has been certified clean by air monitoring tests and visual inspections. Discharge of asbestos fibers to the outside of the building will not be permitted.

B. Size negative air pressure system(s) to provide a minimum of one air change every l5 minutes for the area under negative pressure. Locate the exhaust unit(s) so that makeup air enters the work area primarily through the decontamination unit and traverses the work area as much as possible. The intent is to provide the air change specified in each work area (room), not just the specified negative pressure. Place the end of the unit or its exhaust duct through an opening in the plastic barrier or wall covering. Seal the plastic around the unit or duct with tape. Wherever possible, the units shall exhaust to the outside of the building. Whenever it is impossible to duct outside, the HEPA units will be run in tandem.

3.10 REMOVAL OF ASBESTOS CONTAINING MATERIALS

A. Thoroughly wet ACM to be removed prior to stripping and/or tooling to reduce fiber dispersal into the air. Accomplish wetting by a fine spray (mist) of amended water or removal Encapsulant. Saturate material sufficiently to wet to the substrate without causing excess dripping. Allow time for water or removal Encapsulant to penetrate material thoroughly. If a removal Encapsulant is used, apply in strict accordance with manufacturer's written instructions.

B. Mist work area continuously with amended water whenever necessary to reduce airborne fiber levels.

C. Remove saturated ACM in small sections from all areas. Do not allow material to dry out. As it is removed, simultaneously pack material while still wet into disposal bags. Twist neck of bags bend over and seal with minimum three wraps of duct tape. Clean outside and move to wash down station adjacent to material decontamination unit.

D. For the removal of thermal insulation such as pipe, hard joints, duct insulation, the density of ACM thermal insulation seldom allows the material to be removed in a completely wet state. However, every attempt should be made to keep the insulation material as wet as possible to prevent release of asbestos fibers.

E. Cut the cloth covering on the insulation along the top seam to allow wetting of the insulation. Do not allow the insulation to fall to the ground or adjacent surfaces. Wet the insulation material and immediately place in a double 6 mil, minimum thickness labeled plastic bag.

F. In certain areas, asbestos pipe insulation will be removed with glove-bags (with prior approval by the project monitor).

1. Seal all critical barriers.
2. Pre-clean if necessary and place one layer of polyethylene under the pipe to be removed.
3. Negative air machines with HEPA filtration will be used in the area.
4. Glove bags will be smoke tested.
5. Place necessary tools into pouch located inside glove-bag. This will usually include bone saw, utility knife, rags, scrub brush, wire cutters, tin snips, and pre-wetted cloth.
6. Place one strip of duct tape along the edge of the open top slit of glove-bag for reinforcement.
7. Place the glove bag around section of pipe to be worked on and staple top together through reinforcing duct tape. Next, duct tape the ends of glove-bag to pipe itself, where previously covered with plastic or duct tape.
8. Place additional layers of tape along the top of the glove-bag to seal the staple holes and to securely support the bag on the pipe.
9. Fill each bag with 2 inches of water to thoroughly wet the removed insulation.
10. Attach vacuum hose through port in bag and tape tightly to prevent leakage.
11. Insert spray nozzle into bag and tape tightly to prevent leakage.
12. One person places his hands into the long-sleeved gloves while the second person directs garden sprayer at the work.
13. Use bone saw, if required, to cut insulation at each end of the section to be removed. A bone saw is a serrated heavy gauge wire with ring-type handles at each end. Throughout this process, spray amended water or removal Encapsulant on the cutting area to keep dust to a minimum.

14. Remove insulation using putty knives or other tools. Place pieces in bottom of bag without dropping.
15. Using nylon scrub brush, rags, and water scrub and wipe down the exposed pipe.
16. Wipe down the inside of the bag with the rags. Remove the water nozzle and tape shut.
17. Encapsulate the exposed ends and cover any exposed ends of pipe insulation with the re-wettable cloth. This shall be done prior to removing the bag.
18. Place the cleaning tools either into the next glove bag or put them into the glove and pull them out. Twist the glove, tape at least twice and cut through the tape. The tools can be dropped into a bucket of water to clean them.
19. Twist the bag several times and turn on HEPA vacuum to remove the air. Tape the twist several times.
20. Slip a 6-mil disposal bag under the glove-bag and while running the vacuum sufficiently to collapse the bag, cut the glove-bag off.
21. Encapsulate all exposed pipes and elbows to lock down any remaining fibers.
22. Remove disposable suits and place these into bag with waste.
23. Collapse the disposal bag with a HEPA vacuum, twist top of bag, seal with at least 3 wraps of duct tape, bend over and seal again with at least 3 wraps of duct tape.

3.11 DECONTAMINATION OF WORK AREA

A. Maintain premises and public properties free from accumulation of waste, debris, and rubbish, caused by operations. Remove visible accumulations of asbestos material and debris. Wet cleans all surfaces within the Work area.

B. Remove the plastic sheets from walls and floors only. Take proper care in folding up plastic sheeting to minimize dispersal of residual asbestos containing debris.

C. Leave the windows, doors, and HVAC vents sealed. Maintain HEPA filtered negative air pressure systems, air filtration and decontamination enclosure systems in service.

D. Remove all debris from floor of Work area. This includes all trash, scraps of lumber, pipes, etc. and all visible asbestos debris. The asbestos debris is primarily deteriorated pipe insulation that has fallen to the ground. Dispose of all debris removed as asbestos contaminated waste. HEPA vacuum the entire floor.

E. In areas that have dirty floors, remove at least one inch of dirt or until visually clean.

F. Clean all surfaces in the Work area and any other contaminated areas with water and with HEPA filtered vacuum equipment. After cleaning the Work area, wait 24 hours to allow for settlement of dust, and again wet clean and clean with HEPA filtered vacuum equipment all surfaces in the Work area. After completion of the second cleaning operation, perform a complete visual inspection of the Work area to ensure that the Work area is free of visible asbestos debris. The negative pressure system may be shut down only after clean air has been achieved.

G. Include sealed drums and all equipment used in the Work area in the cleanup and remove from Work areas, via the equipment decontamination enclosure system, at an appropriate time in the clean sequence.

H. Conduct cleaning and disposal operations to comply with applicable ordinances and antipollution laws. Do not burn or bury rubbish and waste materials on job site. Do not dispose of volatile waste in storms or sanitary drains. Do not dispose of waste into streams or waterways.

I. Store volatile waste in covered metal containers during Work hours and remove from premises at end of Workday. Prevent accumulation of waste, which create hazardous conditions. Provide adequate ventilation during use of volatile or noxious substances.

J. If the Project Monitor, within 24 hours after the second cleaning, finds visible accumulations of asbestos debris in the Work area, repeat the wet cleaning until the Work area is in compliance, at no additional expense to the Owner.

K. Remove the first layer of plastic sheet from walls and floors only. Take proper care in folding up plastic sheeting to minimize dispersal of residual asbestos containing debris.

L. Leave the windows, doors, and HVAC vents sealed. Maintain HEPA filtered negative air pressure systems, air filtration and decontamination enclosure systems in service.

M. Following the final visual inspection by the Project Monitor, after the removal of ACM and decontamination of Work areas, and while space enclosures systems remain in place, seal all surfaces from which ACM has been removed to assure immobilization of any remaining fibers. Use a colored sealant so that complete coverage may be ensured by a visible inspection by the Project Monitor to verify that asbestos-containing material has been adequately removed. Apply sealer in accordance with manufacturer's recommendations using airless spray equipment.

N. Clearance air test samples will be taken by Project Monitor 24 hours after the encapsulation. Aggressive air sampling will be conducted using 20" rotating fans, leaf blowers, or other devices as selected by the Project Monitor. If the Work area is found visually clean and encapsulated, clearance air samples will be made to determine fiber concentrations. Analysis will be made using Phase Contrast Microscopy.

3.12 WORK AREA CLEARANCE

A. The Work is complete when the Work area is visually clean and airborne fiber levels have been reduced to the level specified below. When this has occurred, the Asbestos Contractor will notify the Project Monitor that the area is ready for clearance.

B. The number and volume of air samples taken, and analytical methods used by the Project Monitor will be in accordance with the schedule given below. Sample volumes given may vary depending upon the analytical instruments used.

C. Phase Contrast Microscopy (PCM) will be used for all testing.

D. Costs for the initial testing required for clearance will be paid by the Owner. Should the initial testing fail, the Asbestos Contractor will reimburse the Designer for the cost of all additional testing based on $90.00 per hour for project monitor and $30.00 per PCM sample and $150.00 per TEM air sample.

3.13 DISPOSAL OF ASBESTOS CONTAINING MATERIAL AND ASBESTOS CONTAMINATED WASTE

A. As the Work progresses, and to prevent exceeding available storage capacity on site, remove sealed and labeled containers of asbestos waste and dispose of such containers at an authorized disposal site in accordance with the requirements of disposal authority.

B. Comply with 29 CFR 1926.1101.

C. Seal all asbestos and asbestos contaminated waste material in rigid fiber or metal drums lined with double thickness 6mil, sealable plastic bags. Label the drums and the plastic bags; transport

and dispose of all in accordance with the applicable OSHA and EPA regulations. At the conclusion of the job, place all polyethylene material, tape, cleaning material and clothing in the plastic lined drum. Seal, correctly label and dispose of asbestos waste material.

D. Transport the sealed drums to the approved waste disposal site. The sealed plastic bags may be removed from the drums and placed into the burial site unless the bags have been broken or damaged. Leave damaged bags in the drums and bury the entire contaminated drum. Uncontaminated drums may be recycled. The sealed bags or drums must be covered the day of disposal. Contractor shall obtain trip tickets at the landfill to document disposal of asbestos containing materials.

E. If a rental vehicle is used to transport asbestos waste, Contractor shall provide to the vehicle's owner a written statement as to the intended use of the vehicle. A copy of such notice, signed by the vehicle owner, shall be provided to the Designer prior to transporting materials in the vehicle. Two layers of 6-mil plastic sheet shall be placed on the floor and walls of the rental vehicle prior to loading any containers of asbestos waste.

3.14 DISPOSAL OF NON-CONTAMINATED WASTE

A. Remove from the site all non-contaminated debris and rubbish resulting from abatement operations. Transport materials removed from demolished areas and disposed of offsite in a legal manner.

3.15 FINAL CLEAN UP

A. Employ experienced workers or professional cleaners for final cleaning. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials, from exposed to view interior and exterior finished surfaces. Polish surfaces so designated.

3.16 UNIT PRICES

A. All quantities listed in 3.01 are approximate. It is the Asbestos Contractor's responsibility to inspect the site and confirm condition and quantities prior to the submission of his/her bid package. It is also the Asbestos Contractor’s responsibility to review the demolition drawings, notes, and phasing configurations.

B. The contractor must include in his/her bid the entire scope of work listed in 3.01. The Contractor must agree and accept all unit prices listed below. Means and methods of removal will be at the discretion of the contractor with prior approval by the on-site monitor and designer.

C. Units prices listed below are inclusive of all related costs.

	Addition	Deduction
1. Various Types of Flooring	$ 7.00 per SF	$ 6.00 per SF
2. Hard Joint Insulation	$ 40.00 Each	$ 35.00 Each
3. Pipe Insulation	$ 40.00 per LF	$ 35.00 per LF
4. Doors	$ 150.00 Each	$ 130.00 Each
5. Windows	$ 350.00 Each	$ 300.00 Each
6. Transite Panels	$ 15.00 per SF	$ 12.00 per SF

END OF SECTION

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SECTION 024100

SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

B. Examine all Drawings and all other sections of the Specifications for requirements therein affecting the work of this trade.

1.02 SCOPE OF WORK

A. The work of this Section consists of site demolition work as indicated on the drawings or specified herein. The work includes, but is not necessarily limited to:

1. Demolition of existing bituminous concrete and concrete pavements.
2. Removal of existing concrete retaining wall, wall cap. footings and railings.
3. Removal of curbing.
4. Removal from the site and legal disposal of all materials resulting from the demolition operations except those specified to be stockpiled.

1.03 RELATED WORK

A. Section 311000 – Site Clearing and Preparation.
B. Section 312000 - Earthwork.

1.04 PERMITS AND CODES

A. All work shall comply with all codes, rules, regulations, laws and ordinances for the City of Worcester the Commonwealth of Massachusetts, and all other authorities having jurisdiction. All work necessary to make site demolition comply with such requirements shall be provided without additional cost to the Owner.

B. The Contractor shall procure and pay for all permits and licenses required for work under this Section.

C. The Contractor shall not close or obstruct any streets or passageways, unless and until the Contractor shall have first secured all necessary municipal or other permits thereof. No material whatsoever shall be placed or stored nor shall parking be permitted in streets or passageways. The Contractor shall conduct operations to interfere as little as possible with the use ordinarily made of both on-site and off-site roads, driveways, sidewalks or other facilities near enough to the work to be affected thereby.

1.05 DISPOSITION OF EXISTING UTILITIES

A. Active utilities existing on the site shall be carefully protected from damage and relocated or removed as required by the work. When an active utility line is exposed during construction, its location and elevation shall be recorded and both the Architect and the Owner notified in writing.

B. Inactive or abandoned utilities encountered during construction operations shall be removed, plugged or capped. The location of such utilities shall be noted and reported in writing to the Architect.

PART 2 - PRODUCTS (none required)

PART 3 - EXECUTION

3.01 WORKMANSHIP

A. Before beginning Demolition work, disconnect or arrange for the disconnection of all utility service lines to the structures to be demolished. Notify the proper local authorities and utility companies, in writing before work commences. Remove all utility and service lines in accordance with the authorities and/or companies having jurisdiction over such work. Identify the location and size of all caps and plugs to the Architect in writing.

B. Take all possible precautions to avoid damaging those materials which are to remain.

C. Demolition work shall be carried out in a careful and orderly manner. Provide adequate protection to persons and property inside and outside of the site.

D. Do not commence work until trees and other items to be saved have been protected as directed by the Architect in the field. Protection shall remain for the duration of the work.

E. Burn no material or debris on the site.

F. Take all possible precautions to avoid damaging those materials which are to be salvaged or reused on the site.

3.02 TITLE, SALVAGE AND REUSE

A. Property belonging to public bodies or public service companies shall not become the property of the Contractor, unless written authorization is given by the Architect.

B. All materials resulting from the Demolition work shall become the property of the Contractor unless otherwise directed by the Architect or specified herein to be stockpiled and shall be removed from the site.

3.03 REMOVAL

A. Demolish and remove the aforementioned items in their entirety, including footings and underground structures.

B. Remove and legally dispose of, at no cost to the Owner, all materials and debris resulting from the Demolition work except those specified herein to be stockpiled. Leave the site in safe and clean condition.

3.04 RESTORATION OF SITE ITEMS

A. Wherever streets, lawns or other items outside the Contract Limit Lines have been excavated in fulfilling the work required under this Contract, the Contractor shall furnish and install all material at no cost to the Owner to bring finish surfaces level with the existing adjacent conditions. All work shall be installed to match the existing conditions. Notify the proper authorities prior to restoring surfaces outside the Limit of Work to assure conformance to existing requirements.

END OF SECTION

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SECTION 02 41 13

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, labor and materials of the following:

1. Challenge and Reach Academy
    a. Remove wooden ballast, handrail, and guardrail.
    b. Remove door, door frame, door hardware. See architectural drawings for salvage doors.
    c. Remove partitions and overhead brackets.
2. Gerald Creamer School
    a. Remove marble threshold
    b. Remove wooden threshold, ballast, handrail, and guardrail.
    c. Remove masonry wall.
    d. Remove ACT and suspension grid.
    e. Remove gypsum board soffit and framing.
    f. Remove partitions and overhead brackets.
    g. Remove metal lockers and return to Owner
    h. Remove wall mounted mirrors.
    i. Remove plumbing fixtures and attachments.
3. Lincoln Elementary School
    a. Sawcut and remove concrete slab.
    b. Remove CMU wall.
    c. Remove wooden threshold, ballast, handrail, and guardrail.
    d. Remove casework, countertops, and related attachments
    e. Remove flooring and substrate
    f. Temporarily remove door and associated hardware, existing frame to remain.
    g. Remove door and door hardware.
    h. Remove gym flooring and substrate
    i. Remove ACT, GWB ceiling, plaster ceiling, and suspension system.
    j. Remove partitions and overhead brackets.
    k. Remove metal lockers and return to Owner.
    l. Remove toilet accessories and plumbing fixtures.
    m. Remove mechanical and electrical items
    n. Remove light fixtures and return to Owner.

4. Thorndyke Road Elementary School
    a. Remove concrete pad and slab.
    b. Remove masonry walls
    c. Remove stone retaining wall and concrete foundation.
    d. Remove roof, roof fascia, and flashing.
    e. Remove metal gutter and downspout.
    f. Remove door, door frame, and door hardware.
    g. Remove raised platform and framing.
    h. Remove floor finish.
    i. Remove ACT, GWB ceiling, plaster ceiling, and suspension system.
    j. Remove metal railing and attachments.
    k. Remove metal column cover.

B. Cutting of new openings in existing walls as required to complete the Work, in coordination with the Work of Sections 01 04 50 – Cutting and Patching

C. Scheduling and sequencing operations without interrupt utilities serving occupied areas. If interruption is required, obtain written permission from the utility company and the Owner. Provide temporary services as necessary to serve occupied and usable facilities when permanent utilities must be interrupted, or schedule interruption when the least amount of inconvenience will result.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
    1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
    2. Section 02 41 13 - Selective Demolition
    3. Section 03 54 13 - Cementitious Underlayment
    4. Section 04 20 00 – Unit Masonry
    5. DIVISION 05 – METALS; including all Sections contained therein.
    6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
    7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
    8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
    9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
    10. DIVISION 09 – FINISHES; including all Sections contained therein.
    11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
    12. Section 14 24 00 – Hydraulic Elevator
    13. Section 21 00 00 – Fire Suppression
    14. Section 22 00 00 – Plumbing
    15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
    16. Section 26 00 00 – Electrical
    17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
    18. Section 28 10 00 – Fire Alarm
    19. Section 31 20 00 - Earth Moving

1.04 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction and deliver them to the Owner, ready for reuse, at a location designated by the Owner. Protect from weather until accepted by Owner.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated. Protect from weather until reinstallation.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed, and salvaged, or removed and reinstalled.

1.05 MATERIALS OWNERSHIP

A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques, antiques, and other items of interest or value to the Owner that may be encountered during selective demolition remain property of the Owner. Carefully remove each item or object in a manner to prevent damage and deliver promptly to a location acceptable to the Owner.

1.06 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 of the Contract Documents

B. Provide qualification data for demolition firms, professional engineers, and refrigerant recovery technicians.

C. Provide schedule of demolition activities, including but not limited to, the following:

1. Detailed sequence of demolition and removal work, with starting and ending dates for each activity. Schedule shall ensure that the Owner's building and on-site operations are uninterrupted.
2. Interruption of utility services, including dates and duration of interruption.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Means of protection for items to remain.

D. Provide an inventory list of items that have been removed and salvaged following completion of the Work of this Section.

E. Provide photographs and videotapes showing existing conditions of adjoining construction and site improvements, prior to commencement of the Work of this Section that may be misconstrued as damage caused by the Work of this Section.

1.07 QUALITY ASSURANCE

A. Examination of Existing Conditions: The Contractor shall examine the Contract Drawings for demolition and removal requirements and provisions for new work. Verify all existing conditions and dimensions before commencing work. The Contractor shall visit the site and examine the existing conditions as he finds them and shall inform herself/himself of the character, extent and type of demolition and removal work to be performed. Submit any questions regarding the extent and character of the demolition and removal work in the manner and within the time established for receipt of such questions during the bidding period.

B. Demolition Firm Qualifications: An experienced firm that specializes in demolition work similar in material and extent to that indicated for this Project.

C. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

D. Standards: Comply with ANSI A10.6 and NFPA 241.

E. Pre-demolition Conference: Review methods and procedures related to selective demolition including, but not limited to, the following:

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and require protection.

1.08 PROJECT CONDITIONS

A. Owner Occupancy:

1. The existing Challege and Reach Academy will be occupied during the Work of this Contract. Ensure any impact or disruption to these occupants is kept to a minimum. The General Contractor shall employ all measures necessary to protect the existing buildings and adjacent property from damage caused by the Work of this Contract.

1.09 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

1.10 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 - PRODUCTS

2.01 GENERAL

A. All Repair materials shall be compatible with existing materials to remain and shall be as approved by the Architect.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate, and measure the nature and extent of conflict. Promptly submit a written report to Designer.

E. Engage the services of a professional engineer registered in the Commonwealth of Massachusetts to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.

1. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

F. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

G. Utility Services:

1. Existing utility services shall be maintained to existing facilities. Provide a minimum three (3) day notice of service shutdown to the Owner.
2. Shutting off all utilities shall be conducted by the Contractor in compliance with requirements of authorities having jurisdiction.

H. Site Access and Temporary Controls:

1. Existing streets and walk shall remain open all the time. Maintain all existing building access and egress capabilities as required by local authorities having jurisdiction.
2. Provide and maintain temporary protection, including chain link fencing as necessary.
3. Provide and maintain protection around existing trees and plantings located on adjacent property.

I. Temporary Facilities:

1. Provide and maintain temporary barricades to prevent injury to people.
2. Provide and maintain temporary weather protection as required.

3. Provide and maintain protection of existing finished work to remain.
4. Provide and maintain protection of existing interior furnishings and equipment.
5. Provide and maintain protection of exterior site improvements to remain, including on adjacent property.

J. Provide and maintain temporary weather-tight enclosure for building exterior as required.

K. Provide and maintain temporary shoring of existing structural building components to remain, including but not limited to, structural steel, brick masonry walls, and concrete floors and wood roof framing.

L. Items to be removed and salvaged shall be cleaned, stored, and transported to the Owner's designated storage area.

M. Items to be removed and reinstalled shall be cleaned, repaired, stored, and reinstalled as required.

N. Existing items to remain shall be protected against damage during construction.

O. Cleaning and Disposal: All waste and debris caused by the Work of this Section shall be legally disposed of offsite, daily, at a facility licensed to receive and process building demolition debris. Burning shall not be permitted. Provide original Bills of Lading to the Owner in accordance with the requirements of the Owner.

3.02 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection in accordance with the requirements of Division 01.
2. Always maintain adequate passage to and from all exits. Before any work is done which significantly alters access or egress patterns, consult with the Designer, and obtain approval of code required egress. Under no condition does it block or interfere with the free flow of people at legally required exits, or in any way alter the required condition of such exits.

B. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new support when required during the progress of selective demolition.
2. Remove temporary shoring, bracing and structural supports when no longer required.
3. Post warning signs and place barricades as applicable during placement and removal of temporary shoring.

C. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around demolition area(s).

1. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction. Provide temporary barricades as required to limit access to demolition areas.
2. Protect existing site improvements, appurtenances, and landscaping to remain.

D. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with demolition operations.

3.03 SELECTIVE DEMOLITION

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering, and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until the work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. All waste and debris caused by the Work of this Section shall be removed and legally disposed of daily, in accordance with requirements of Section 01 50 00 - Temporary Facilities and Controls.

B. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack items in crates after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to storage area designated by the Owner.
5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.

4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, support, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Designer, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

E. Items for Re-use and Preservation of Existing Surfaces to Remain:

1. The Contractor shall inspect closely each item specifically designated to be relocated, re-used, or turned over to the Owner prior to its removal, and immediately report damages and defects to the Designer and Owner. The Contractor shall be responsible for any subsequent damage to the same other than latent defects not readily apparent from close inspection and shall bear responsibility for its repair or same replacement as directed by the Designer.

F. Unless special surface preparation is specified under other Specification Sections, leave existing surfaces that are to remain in a condition suitable to receive new materials and/or finishes.

3.04 PROTECTION OF PUBLIC AND PROPERTY

A. Provide all measures required by federal, state, and municipal laws, regulations, and ordinances for the protection of surrounding property, the public, and workmen during all demolition and removal operations. Measures are to be taken, but not limited to installation of sidewalks, sheds, barricades, fences, warning lights and signs, trash chutes and temporary lighting.

B. Protect all walks, roads, streets, curbs, pavements, trees, and plantings, on and off premises, and bear all costs for correcting such damage as directed by the Designer.

C. Demolition shall be performed in such a manner that will ensure the safety of adjacent property. Protect adjacent property from damage and protect persons occupying adjacent property from injuries which might occur from falling debris or other cause and so as not to cause interference with the use of other portions of the building, of adjacent buildings or the free access and safe passage to and from the same.

D. Every precaution shall be taken to protect against movement or settlement of the building, of adjacent buildings, sidewalks, roads, streets, curbs, and pavements. Provide and place at the Contractor's own expense, all necessary bracing and shoring in connection with demolition and removal work.

E. Remove portions of structures with care by using tools and methods that will not transfer heavy shocks to existing and adjacent building structures, both internal and external of the work area.

F. Provide and maintain in proper condition, suitable fire resistive dust barriers around areas where interior demolition and removal work is in progress. Dust barriers shall prevent dust migration to adjacent areas. Remove dust barriers upon completion of major demolition and removal in the work area.

3.05 DISCOVERY OF HAZARDOUS MATERIALS

A. If hazardous materials, such as chemicals, asbestos-containing materials, or other hazardous materials are discovered during work, cease work in the affected area only and immediately notify the Designer of such discovery. Do not proceed with work in such areas until instructions are issued by the Designer. Continue working in other areas.

B. If unmarked containers are discovered during work, cease work in the affected area only and immediately notify the Designer of such discovery. Do not proceed with work in such areas until instructions are issued by the Designer. Take immediate precautions to prohibit endangering the containers' integrity. Continue working in other areas.

3.06 CUTTING

A. Perform all cutting of existing surfaces in a manner which will ensure a minimal difference between the cut area and new materials when patched. Use extreme care when cutting existing surfaces containing concealed utility lines which are indicated to remain and bear full responsibility for repairing or replacement of all such utilities that are accidentally damaged.

B. Provide a flush saw cut edge where pavement, curb, and concrete removals abut new construction work or existing surfaces to remain undisturbed.

3.07 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Comply with requirements of Division 1, and the following.
   1. Do not allow demolished materials to accumulate on-site.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
   3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

3.08 CLEANING

A. Cleaning adjacent structures and improvements of dust, dirt, and debris caused by the Work of this Section. Premises shall be left in a clean condition and ready to accept alteration work and new construction.

3.09 RUBBISH REMOVAL

A. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION

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SECTION 03 54 13

CEMENTITIOUS UNDERLAYMENT

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK

A. The Work of this Section shall include, but not be limited to, furnishing and installation of the following:
   1. Cementitious underlayment to fill floor depressions and holes.
   2. Cementitious underlayment required to achieve level subfloors within the tolerances specified for the installation of new Work.
   3. Filling depressions and holes in new floors and leveling of new floors that exceed a levelness of 3/16 in. in 10 ft.
   4. Cementitious underlayment at ramp.
   5. Cementitious underlayment at threshold

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
   2. Section 02 41 13 - Selective Demolition
   3. Section 03 54 13 - Cementitious Underlayment
   4. Section 04 20 00 – Unit Masonry
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
   7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
   8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
   9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
   10. DIVISION 09 – FINISHES; including all Sections contained therein.
   11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
   12. Section 14 24 00 – Hydraulic Elevator
   13. Section 21 00 00 – Fire Suppression
   14. Section 22 00 00 – Plumbing
   15. Section 23 00 00 - Heating, Ventilating and Air Conditioning

16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.04 QUALITY ASSURANCE

A. The installer shall be a firm which has at least five years' experience in Work of the type required by this Section, and which is acceptable to the manufacturers of the gypsum underlayment materials.

B. Provide gypsum underlayment materials which are the products of one manufacturer. Provide secondary materials which are acceptable to the manufacturer of gypsum underlayment materials.

1.05 TESTS

A. Burning Characteristics: Provide materials whose surface burning characteristics, when tested in compliance with ASTM E84 are Class A for flame spread, fuel contributed, and smoke developed.

1.06 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures and in accordance with requirements of the Contract Documents.

B. Submit manufacturer's product data, installation instructions, use limitations and recommendations for each material used. Provide certifications stating that materials comply with requirements.

C. Submit certified reports demonstrating compliance with tests and performance required.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products in unopened factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations to protect from all possible damage.

1.08 PROJECT CONDITIONS

A. Perform Work only when existing and forecasted weather conditions are within the limits established by manufacturers of the materials and products used.

B. Proceed with Work only when substrate construction and penetrating Work is complete.

C. Comply with the approved manufacturer's requirements and recommendations for ventilation.

1.09 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner's Project Manager, Architect, and related subcontractors.

B. Complete Work of this Section before Work which could be damaged by water, humidity, and splashing of underlayment is begun.

PART 2 - PRODUCTS

2.01 PRODUCTS

A. Provide cementitious underlayment at all subfloor patching and filling of cracks, holes, voids, and depressions. Cementitious underlayment shall be trowel grade, fast setting, latex modified, cement-based patching compound, PRP 110 PLANI/PATCH as manufactured by MAPEI, Inc., or equal by Ardex or Maxxon. Cementitious underlayment shall comply with the following performance characteristics:

1.	Thickness Range:	From feather edge to 1/2 in.
2.	Pot Life:	8-10 minutes at 72°F
3.	Final Set:	Approximately 30-40 minutes at 72°F in accordance with ASTM C 191
4.	Compressive Strength:	1400 psi after 6 hours, 4564 psi after 28 days in accordance with ASTM C 109

B. Acrylic latex additive for patching compound shall be PRP 312 PANI/PATCH PLUS, as manufactured by MAPEI, Inc., or equal by Ardex or C-Cure.

C. Provide no trowel, self-leveling, cement-based topping, K500 as manufactured by Ardex, or equal by MAPEI, for infill of subfloors. Self-leveling concrete topping shall comply with the following characteristics:

1.	Thickness Range:	1/4 in. to 5 in. with addition of appropriate aggregate
2.	Initial Set:	30 minutes at 72° F in accordance with ASTM C 191
3.	Final Set:	90 minutes at 72° F in accordance with ASTM C 266
4.	Compressive Strength:	5,300 psi after 28 days in accordance with ASTM C109
5.	Flexural Strength:	1,000 psi at 28 days in accordance with ASTM C 109

D. Latex emulsion for cement-based underlayment shall be LL2, as manufactured by MAPEI, Inc., or equal by Ardex or C-Cure.

E. Provide pea gravel for use with thick self-leveling installations, in accordance with approved manufacturer’s written requirements.

F. Water: Clean and drinkable.

G. Primers shall be as recommended by the approved underlayment manufacturer for subfloor condition and porosity.

PART 3 - EXECUTION

3.01 INSPECTION

A. The Trade Contractor of this Section shall examine substrates, supports, and conditions under which this Work is to be performed and notify General Contractor, in writing, of conditions detrimental to the proper completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected. Beginning Work means Installer accepts substrates and conditions.

3.02 PREPARATION

A. Strictly comply with manufacturer's instructions and recommendations, except where more restrictive requirements are specified in this Section.

B. Clean subfloors free of grease, wax, curing compounds and all other foreign materials. Subfloors shall be solid and sound; remove all soft or crumbly materials.

C. Make adhesion tests as recommended by manufacturer to ensure good bond to substrate.

D. Prime subfloors as recommended by underlayment manufacturer, using the correct primer for porous and non-porous subfloors.

3.03 INSTALLATION

A. Strictly comply with manufacturer's instructions and recommendations, except where more restrictive requirements are specified in this Section.

B. Mix product directly from sealed package with water in proportions recommended by manufacturer. Avoid overwatering.

C. Pour or pump plastic underlayment onto subfloors and spread with a wide squeegee. Place sufficient material to cover highpoints with at least 1/8 in. of underlayment; featheredge where necessary to meet adjacent construction.

D. If two or more layers of underlayment are applied, place the second layer after the first layer has set to walkable hardness.

3.04 TOLERANCES

A. The following allowable installed tolerances are allowable variations from locations and dimensions indicated by the Contract Document and shall not be added to allowable tolerances indicated for other Work.

1. Allowable Variation from True Level: ± 1/16 in. in 10 ft.

3.05 PROTECTION

A. Provide temporary protection to ensure Work being without dirt, dust, damage, or deterioration at time of finish floor application.

3.06 RUBBISH REMOVAL

A. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION

SECTION 04 20 00

UNIT MASONRY
(Filed Sub-Bid Required)

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 FILED SUB-BID REQUIREMENTS

A. Sub-bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the Enter Name and Address for Place of Bid Openging at time and place stipulated in the "Invitation to Bid/Notice to Contractors".

Name of Sub-Bidder:

Project:	Worcester Public Schools ADA Upgrades for Challenge & Reach, Gerald Creamer, Lincoln, and Thorndyke Schools.
Sub-Bid for Section:	04 20 00 – Unit Masonry

B. Each sub-bid submitted for work under this Section shall be on forms furnished by the City of Worcester as required by Section 44F of Chapter 149 of the General Laws, as amended. Sub-Bid forms may be obtained at the Enter Name and Address of location where forms may be obtained in person, or by written request.

C. Sub-bids filed with the City of Worcester shall be accompanied by a BID BOND or CASH or CERTIFIED CHECK or a TREASURER'S or CASHIER"S CHECK issued by a responsible bank or trust company payable to the City of Worcester in the amount of five (5) percent of the bid. A sub-bid accompanied by any other form of bid deposit than those specified will be rejected.

D. The Sub-Bidder of this Section shall include Work of the following Sections:

1. 04 21 11 - Reinforced Unit Masonry

B. The Sub-Bidder of this Section shall examine all drawings and specification sections for requirements affecting the Work of this Section as shown primarily in the following drawings:

1. Lincoln Elementary School: A1.01 through A12.01.
2. Thorndyke Road Elementary School: A1.01 and A1.02.

C. The Sub-Bidder of this Section shall examine other drawings and specification sections that could affect the Work of this Section as it relates to coordination. The other drawings are the following:

1. Lincoln Elementary School: D1.01 through D7.01; S0.01 through S1.02; FP1.01 through FP1.03; DP1.01 and P1.01; ED.1 through FA.2; DH1.01 and H1.01; VT.01.
2. Thorndyke Road Elementary School: D1.01 through D7.01; S0.01 through S2.01; FP1.01 through FP1.03; DP1.01 through P1.02; ED.0 through FA.3; H1.01 and H1.03; VT.02.

1.03 DESCRIPTION OF WORK

A. The Work of this Section shall include, but not be limited to, furnishing and installation of the following:
   1. Solid and cored clay brick masonry units.
   2. Concrete Masonry Units (CMU)
   3. Mortar at the following conditions:
      a. New mortar color to match existing.
      b. New mortar color to be selected by the Architect.
      c. Repoint and patch existing mortar at deteriorated areas and at new helical tie installation.
   4. Rigid board insulation within masonry cavity wall construction
   5. Self-adhered thru wall flashing with drip edge
   6. Horizontal reinforcing ties, thermally broken brick ties, helical ties, anchors, cavity, and mortar drop prevention, control joint materials, weep baffle, slot anchors, channel anchors, stainless steel drip edge, bolts at masonry clip angles, and accessories.
   7. Cold weather protection for masonry Work.
   8. Final cleaning of exterior masonry and interior exposed to view masonry work.

B. Items to be Installed Only: Install the following items as furnished by the designated Sections:
   1. Section 04 21 11 - Reinforced Unit Masonry: Vertical reinforcing bars and mortar and grout mixes
   2. Section 07 27 26 – Fluid-Applied Membrane Air Barriers. Self-Adhered Air Barrier Membrane.
   3. Section 05 50 00 - Metal Fabrications: Loose steel angle lintels for all openings at masonry walls, anchors, blocking, plates, anchor bolts, metal strip reveal for cast stones, and ties to be built into masonry.
   4. Fire Protection, Plumbing, Mechanical, Electrical, Communication, and Security Sections: Access panels, sleeves for piping and conduit to be built into the Work of this Section.

C. NOTE: Build-in all anchors, blocking, plates, anchor bolts, ties and all other items required to be built into masonry as furnished by other trade Sections. The Mason shall cooperate with all other trades and notify them sufficiently in advance of the time when the material furnished by them is to be built into the masonry so that progress of the Work shall not be impeded. Take every precaution to minimize cutting and patching.

1.04 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
   2. Section 02 41 13 - Selective Demolition
   3. Section 03 54 13 - Cementitious Underlayment
   4. Section 04 20 00 – Unit Masonry
   5. DIVISION 05 – METALS; including all Sections contained therein.

6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.05 QUALITY ASSURANCE

A. Provide the products of one manufacturer for each type of material required for the Work of this Section.

B. Before beginning primary Work of this Section, provide two 4 ft. x 6 ft. mock-ups of each different type of masonry wall and obtain Architect's acceptance of visual qualities at transition of brick types, and cast stone windowsill. Include all flashings, reinforcing, ties, back-up structural components, lintels, window and other related Work of this and other Sections. Provide mock-ups at locations and with orientation acceptable to Architect. Protect and maintain acceptable mock-ups throughout the Work of this Section to serve as criteria for acceptance of this Work.

C. Reinforced concrete masonry construction shall conform to all requirements of "Specification for Concrete Masonry Construction (ACI 531.1)" published by the American Concrete Institute, except as modified by the supplemental requirements contained herein or as specified in Section 04 21 11 - Reinforced Masonry.

1.06 TESTS

A. Where fire-resistance ratings are indicated or required by authorities having jurisdiction, provide materials and construction which is identical to assemblies whose fire-resistance rating has been tested in compliance with ASTM E119 by independent agencies acceptable to the Architect and authorities having jurisdiction. If proposed units have not been tested ascertain fire resistance rating by utilizing equivalent thickness/type of aggregate calculations.

B. Verify by testing in compliance with ASTM C780 that mortar and grout used meets specification requirements. At random, take samples from mortar boards every day. Make written reports.

1. Testing Agency: The General Contractor will employ an independent testing agency to perform tests and certifications indicated.

1.07 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures and in accordance with requirements of the Contract Documents.

B. Samples:
   1. Submit five samples of typical brick showing extreme variations in color and texture.
   2. Submit two full size concrete masonry units, glazed concrete masonry units and high density prefaced concrete masonry units of each type and color required.
   3. Submit two ties and anchors of each type.
   4. Submit 6 in. long samples of mortar in aluminum channels.
   5. Submit samples of mortar drop prevention, cell vent weeps, and joint control materials.
   6. Submit a minimum of 12 in. x 12 in. sample of through wall flashing material.
   7. Furnish a 1 ft. x 1 ft. sample of cavity insulation labeled with manufacturer's name, thickness, and location of use.

C. Submit certified reports for tests required.

D. Provide large scale, detailed shop drawings for fabrication of all masonry lintels, bond beams and reinforced masonry components, showing sizes, profiles, reinforcing and all other critical elements. Indicate special face brick shapes showing size and profiles for each unit required.
   1. Provide coordination drawings showing location of anchors and ties which must be built into other Work such as cast stone lintel elements.

E. Submit certification of compliance for each fire-resistant type of CMU used. Certification shall identify aggregate and equivalent thickness of CMU if not a U.L. Design Number.

1.08 DELIVERY, STORAGE AND HANDLING

A. Deliver and store unit masonry to project site stacked on pallets and in undamaged condition and handle materials in strict compliance with manufacturer's instructions and recommendations, as necessary to protect from all possible damage.

1.09 PROJECT CONDITIONS

A. Hot Weather Protection: Use mortar within 1-1/2 hours after mixing. Discard all mortar over 1-1/2 hours old and all mortar that has stiffened due to hydration (setting).

B. Cold Weather Protection: The Masonry Subcontractor shall strictly comply with recommendations of Brick Institute of America Technical Note No. 1a, Cold Weather Masonry Construction, Construction and Protection Recommendations and The Portland Cement Association. When the temperature is below 40°F temporary enclosures and heat shall be provided by the General Contractor and the following procedures shall be followed by the Masonry Subcontractor:
   1. Cold Weather Protection:
      a. Preparation:
         1) Remove ice or snow formed on masonry bed by carefully applying heat until the top surface is dry to touch.
         2) Remove frozen or damaged masonry.
         3) Sprinkle with heated water when brick suction exceeds 30 gm/min./30 sq. in.
            a) When units are above 32°F, heat water above 70°F.
            b) When units are below 32°F heat water above 130°F.

4) Use dry masonry units.
5) Do not use frozen units.

2. Construction requirements while Work is progressing:
   a. Air temperature 40°F to 32°F:
      1) Heat sand or mixing water to produce mortar temperatures between 40°F and 120°F.
   b. Air temperature 32°F to 25°F:
      1) Heat sand and mix water to produce mortar temperatures between 40°F and 120°F.
      2) Maintain temperature of mortar on boards above freezing.
   c. Air temperatures 25°F to 20°F.
      1) Heat sand and mix water to produce mortar temperatures between 40°F and 120°F.
      2) Maintain mortar temperatures on boards above freezing.
      3) Use approved heat sources on both sides of walls under construction by the General Contractor.
      4) Use windbreaks when the wind is more than 15 mph.
   d. Air temperature 20°F and below:
      1) Heat sand and mix water to produce mortar temperatures between 40°F and 120°F.
      2) The General Contractor shall provide temporary enclosures and heat as necessary to maintain air temperature above 32°F.
      3) Minimum temperature of units when laid 20°F.
      4) Produce subsequent mortar batches within +/-10°F of the first batch.
3. Maintain new bricks and mortars above 32 deg. for 72 hours. Protection requirements for completed masonry and masonry not being Worked on:
   a. Mean daily air temperature 40°F to 32°F: Protect masonry from rain or snow for 24 hours by covering it with non-staining weather-resistive membrane.
   b. Mean daily air temperature 32°F to 25°F: Completely cover masonry with non-staining weather-resistive membrane for 24 hours.
   c. Mean daily air temperature 25°F to 20°F: Completely cover masonry with insulating blankets or equal protection for 24 hours.
   d. Mean daily air temperature 20°F and below: Maintain masonry temperature above 32°F for 24 hours by enclosure and supplementary heat, electric heating blankets, infrared lamps, or other acceptable methods provided by the General Contractor.

C. Cover Work at the end of each day and whenever Work is not in progress. Extend cover down both sides of walls at least 24 in. and hold securely in place.

D. Load Application:
1. Do not apply uniform floor loading or roof loading for at least twelve hours after building masonry columns or walls.
2. Do not apply concentrated loads for at least three days after building masonry columns or walls.

E. Perform Work only when ambient temperature and surface temperature of existing unit masonry and new materials are between 40 deg. F and 80 deg. F. Work only when temperature is forecasted to be 40 deg. F or above for at least one week after completion of Work unless temporary enclosures and heat are provided.

F. Prevent mortar from staining the face of masonry and other building components that are to be left exposed. Clean exposed masonry immediately using soft brushes and water only. Protect the base of walls from splashed mud and other stains. Protect sills, ledges, and projections from mortar droppings.

1.10 CUTTING AND CORING

A. The installation of new Work that requires cutting and coring of floors, walls, and roofs with dimensions 5-1/2 in. or less shall be performed by the Subcontractor of this Section. The General Contractor shall cut and core floors, walls, and roofs with dimensions not indicated by the Subcontractor of this Section.

1.11 SCAFFOLDING AND EQUIPMENT

A. The Subcontractor of this Section shall provide, maintain, and safely remove when no longer required, interior and exterior staging, scaffolding, hoists, and all other related equipment to comply with all applicable Federal, State, and local regulations and codes.

1.12 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner's Project Manager, Architect, and related subcontractors.

PART 2 - PRODUCTS

2.01 BRICK VENEER MASONRY

A. Provide face brick conforming to ASTM C 216, Type FBX, Grade SW. Brick shall be cored and solid brick units, with finish and coloration as selected by the Architect from the approved manufacturer's complete selection of standard colors. Brick units shall meet the following guidelines:

1. Grade SW for all Work
2. Color/Finish/Texture: As selected by the Architect from the manufacturer's complete selection.
3. Lintel brick shall be solid brick units: Use solid bricks where required so cores shall not be visible after final installation.
4. Minimum Compressive Strength: 9000 psi
5. Maximum saturation coefficient: 0.78

B. Provide Economy Size Brick masonry, 3-5/8 in. x 3-5/8 in. x 7-5/8 in., as described and manufactured below, or Architect approved equal, at locations, orientation, and bond style as indicated on the Drawings, and as follows:

1. Brick Type: Brick size and color to match existing brick, ASTM C-216, Grade SW, Type FBS.

C. Provide all special shaped brick necessary for a complete installation in accordance with requirements of the Contract Documents, and as indicated in the Drawings. Special shape brick shall match performance criteria and color of the basic masonry type. Provide solid shaped brick for sills and caps, and elsewhere as indicated. Use solid bricks where required so cores shall not be visible after final installation

2.02 CONCRETE MASONRY UNITS

A. Provide hollow load bearing concrete masonry units conforming to ASTM C90. Provide concrete masonry having the following characteristics:

1. Provide units with nominal 8 in. high x 16 in. long face dimensions (7-5/8 in. x 15-5/8 in. actual), unless indicated otherwise. Provide thicknesses indicated, or if not indicated, as necessary to create properly supported, structurally safe walls built within the height to width limitations required by codes and recommended by the National Concrete Masonry Association.
2. Provide special shaped units for lintels, bond beams, corners, jambs, headers, control joints and other conditions. Never expose cores. Provide bullnose units full wall height at all vertical and horizontal corners, and door jambs, where CMU is exposed.
3. Provide normal weight units, except provide units with weight as standard with manufacturer for all units in fire-rated assemblies.

2.03 RIGID INSULATION AT MASONRY CAVITY WALLS

A. Provide glass-fiber-reinforced polyisocyanurate continuous insulation (ci) at exterior wall locations behind the brick masonry veneer, Thermax (ci) exterior insulation as manufactured by DuPont or approved equal by Owens Corning, or Dow Chemical. The exterior continuous insulation shall have a foam core faced with nominal 1.25 mil. thermoset-coated aluminum on one side and 0.9 mil smooth, reflective aluminum on the other side. The exterior continuous insulation shall have the following performance properties:

1.	R-Value:	6.9 per inch, aged R-value at 1 in. of cured foam @ 75°F mean temperature. R-value expressed in ft2•h•°F/Btu. R-value is determined by ASTM C518 using the aging process in ASTM C1289 (90 days @ 140°F).
2.	Compressive Strength:	25 psi minimum, in accordance with ASTM D1621
3.	Flexural Strength	40 psi minimum, in accordance with ASTM C203
4.	Water Absorption:	0.1% maximum by volume, in accordance with ASTM C209
5.	Water Vapor Permeability:	<0.01 perm maximum, in accordance with ASTM E96
6.	Dimensional Stability:	0.2% maximum linear change, in accordance with ASTM D2126
7.	Flame Spread:	25, Class A in accordance with ASTM E84
8.	Smoke developed:	450, in accordance with ASTM E84
9.	Thickness:	3-1/2 in. of combined shiplap continuous insulation
10.	Size:	48 in. x 96 in.

2.04 REINFORCING, TIES AND ANCHORS

A. Horizontal joint reinforcing and masonry to masonry ties shall be truss type, welded wire units fabricated from 9-gauge, ASTM A 82 cold-drawn galvanized steel wire with deformed side wires and smooth cross wires spaced 16 in. O.C. Provide prefabricated corners and tees.

B. Furnish weld-on ties for masonry anchors for installation under the Work of Section 05 12 00 – Structural Steel Framing, as follows, or as otherwise required to provide anchorage in accordance with requirements of the Contract Documents.

1. Masonry perpendicular to column flange: 12 gauge, 1-1/4 in. wide, No. 353 as manufactured by Hohmann & Bernard, or equal by Heckmann Building Products, Inc. and Masonpro.
2. Masonry parallel to column flange: 12 gauge, 1-1/2 in. wide, No. 354 as manufactured by Hohmann & Bernard, or equal by Heckmann Building Products, Inc. and Masonpro.
3. Masonry perpendicular to column web: 1/4 in. diameter by 8 in. long, No. 359, and 3/16 in. diameter by 12 in. long, No. 301W, both as manufactured by Hohmann & Bernard, or equal by Heckmann Building Products, Inc. and Masonpro.

C. Provide joint stabilization anchors to connect masonry to other materials and to allow in-plane movement while resisting out-of-plane movement and to maintain alignment of expansion joints and control joints while allowing movement within the plane of the wall. Provide joint stabilization anchors with two, 8-gauge steel wires enclosed in a 1/32 in. sheet metal sleeve separated at the center by a plastic sleeve, D/A 2200 as manufactured by Dur-O-Wal or equal by Heckmann Building Products, Inc. and Masonpro. Provide mill galvanized units for interior partitions and stainless-steel units for exterior wall applications.

D. Provide miscellaneous hot-dip galvanized steel straps, bars, rods, and similar items, fabricated from not less than 16-gauge sheet steel or 3/16 in. diameter steel wire, to provide a complete installation in accordance with requirements of the Contract Documents.

E. Provide structural break away anchors for lateral bracing of CMU fire walls as called for on the Drawings. Structural ties shall be minimum 1/8 in. rolled strip zinc alloy, Type 70 X as manufactured by Heckmann Building Products Inc. or equal by Hohmann & Barnard, Inc. and Masonpro. The melting point of the zinc strips shall be below 800 degrees Fahrenheit.

F. Provide vertical reinforcing steel bars in accordance with requirements of Section 04 21 11 - Reinforced Unit Masonry.

G. Provide hot-dipped galvanized, ASTM A153, class B2, 1.5 oz./ft.^{2} zinc coating on all ties, reinforcing, anchors and similar items which extend into an exterior wall assembly, except items of stainless steel. Semi-exposed areas shall be considered exterior.

H. Provide reinforcing, ties, and anchors for all Work of this Section, including but not limited to, concrete masonry, clay brick veneer, and cast stone utilizing the appropriate type for each condition, including stainless steel for cast stone, in accordance with requirements of this Section, Section 04 21 11 – Reinforced Unit Masonry, and Cast Stone Institute Technical Manual.

1. All ties for use at cast stone masonry shall be designed by the approved cast stone manufacturer.

2.05 FLASHING AND MISCELLANEOUS MATERIALS

A. Provide 15 lb. roofing felt as bond breaker, complying with ASTM D 226 or ASTM D227.

B. Provide solid rubber control joint strips with a Shore "A" hardness of 60 to 80, designed to fit standard CMU control joint, and maintain the lateral stability of the wall.

C. Provide self-adhered, 2 mil stainless steel, thru-wall flashing, York 304 as manufactured by York, or equal by Vaproshield or Masonpro.

D. Provide stainless steel drip edges, 0.025 in. thick, soldered at all joints, ASTM A167. Extend horizontally into wall and 1/2 inch out from exterior face of wall with outer edge bent down 30 degrees and hemmed. See Architectural Drawings for sizes and configurations.

E. Provide one-part non-skinning butyl sealant conforming to ASTM C1311.

F. Provide flexible, ultraviolet resistant, gray, polypropylene, honeycomb design, masonry cavity vent, Quadro-Vent as manufactured by Hohmann & Bernard, or equal by Heckmann Building Products, Inc., and Block-Lok. Vent material shall be 3/8 in. x 3-1/2 in. x 3-1/2 in., for use in the vertical (head) mortar joint of the masonry veneer.

G. Provide Mortar Net™ as manufactured by Hohmann & Bernard, or equal by Heckmann Building Products, Inc., and Blok-Lok. Mortar net shall be manufactured of high-density polyethylene (HDPE), 1 in. or 2 in. thick or as otherwise required to fully fill masonry cavity, with continuous 3 in. high bottom strip and 10 in. overall height, in manufacturer's standard length. The net shall be 90 percent open mesh allowing water and air to move through the material itself and out of cavities.

H. Provide heavy -duty, 14 gages, roll-formed stainless steel termination bar used to attach thru-wall flashing to exterior sheathing.

I. Provide prefabricated closed cell neoprene expansion joint material for use as fillers in vertical and horizontal movement of clay masonry. Material shall conform with the requirements of ASTM D1056, Class RE41.

1. Vertical expansion joint shall be 3/8 in. thick by 3 in. wide, Type D/A-2015 as manufactured by Dur-O-Wall, Inc. or equal by Heckmann Building Products, Inc., and WR Meadows.
2. The horizontal expansion joint shall be 1/4 in. thick by 2-3/4 in. wide with an adhesive surface on one side, Type D/A-2010 as manufactured by Dur-O-Wall, Inc. or equal by Heckmann Building Products, Inc., and WR Meadows.

2.06 MORTAR AND GROUT MIXES

A. Repoint and patch existing mortar at deteriorated areas and at new helical tile installation.

B. Provide Portland cement and Type S hydrated lime, Blue Circle Eaglebond or equal by Cemex and Lehigh Hanson. Mortar cement shall comply with requirements of ASTM C150, Type II, and shall be free from water soluble salts and alkalies. Provide mortar complying with ASTM C270 property specifications. When mixing use known volume measures; do not batch by shovel. Mortar aggregate shall be well graded, complying with ASTM C 144.

1. Provide type N mortar for masonry above grade and interior and exterior Work, except as indicated otherwise and below.
2. Provide type S mortar for reinforced and load bearing masonry, and elsewhere as indicated.

C. Mortar pigment shall be natural and synthetic oxides of iron and chrome, compounded for use in mortar. Use only pigments with proven record of satisfactory performance as manufactured by Davis Colors or equal by Solomon Colors and Stoopen & Meeus. Mortar colors shall be selected by the Architect from the approved manufacturer's complete selection of standard and premium colors.

1. Provide mortar color to match existing.
2. Provide a minimum of three cement colors as necessary to provide mortar color as selected by the Architect from the approved manufacturer's complete selection of standard colors.

D. Provide grout complying with requirements of ASTM C 476 and with consistency appropriate to conditions so that grout shall completely fill all spaces intended to receive grout. Grout aggregate shall comply with requirements of ASTM C 404

E. Do not use admixtures or antifreeze agents. Do not use masonry cement. Do not use calcium chloride or any compounds or mortar ingredients containing chlorides.

F. Lime shall be hydrated, Type S, complying with ASTM C 207.

G. Mortar to be used in the architectural CMU, used the same integral water repellant that is used by the manufacturer of the CMU.

H. Water shall be clean and potable.

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

A. Strictly comply with industry standards and recommendations of Brick Institute of America, National Concrete Masonry Association, and Pre-stress Concrete Institute, American Concrete Institute, except where more restrictive requirements are specified in this Section. The Masonry Subcontractor shall examine substrates and conditions under which this Work is to be performed and notify the General Contractor, in writing, of conditions detrimental to the proper completion of the Work. Beginning Work means Installer accepts substrates and conditions.

B. Lay face brick, calcium silicate units, and cast stone, with joints in running bond to conform with coursing shown on the Drawings and lay concrete masonry with 3/8 in. wide joints in running bond with each vertical joint centered over masonry unit in next lower course, except indicated otherwise.

1. Provide expansion, control and isolation joints in masonry Work where shown, or if not shown, at locations approved by Architect. Provide expansion joints spaced not more than 30 ft. O.C. and between 4 ft. and 6 ft. of outside corners in brick masonry construction.
2. Cover Work at the end of each day and whenever Work is not in progress. Extend cover down both sides of walls at least 24 in. and hold securely in place.

C. Tool joints with weather joints as Work proceeds. Compress mortar to form a dense, smooth weathertight surface. Rake out mortar where sealants are shown to be installed.

D. Lay masonry plumb and level with full bed and head joints, fully buttered and shoved into place. Do not slush joints. Keep cavity walls completely clear and free from projections and obstructions. Strike joints facing cavity flush.

E. Remove, clean, and reset with fresh mortar all masonry units that are disturbed after laying.

F. Provide weeps vents at every third head joint immediately above all flashings and ledges. Install vent in joint while placing masonry units in wall. Position vent 1/8 in. from exterior face of masonry.

G. Install mortar net in conformance with manufacturer's written instructions and recommendations. Install mortar net in one continuous row at base of wall and over all openings directly on flashing of cavity wall construction. Multiple thicknesses of the mortar net may be installed to match cavity widths. When installing multiple thicknesses, align the dovetail Sections with each other.

H. Cut masonry units with power saw designed for cutting masonry with sharp, unchipped edges. Cut masonry to form special shapes as indicated. Where special shapes cannot be cut or formed without exposing coring or frogging, provide custom made special shaped units.

I. Install Work with random color variations with no groups of lighter or darker units. Take masonry units from stacks randomly to avoid noticeable color variations.

J. Layout walls in advance for accurate spacing, uniform joint widths, and accurate bond pattern. Avoid the use of less-than-half size units.

K. Where Work is interrupted, do not tooth masonry. Cut back one-half unit in each higher course.

L. Do not wet concrete masonry units before installation. Wet clay masonry before installation.

M. Leave openings for other materials and equipment as necessary. Complete masonry Work after installation of other Work. Build-in other Work as masonry Work progresses to the greatest extent possible.

N. Grout units wherever shown and at all masonry lintels, bond beams, jambs and bearing points. At bearing points, fully grout concrete masonry for three full courses immediately below bearing point. Fully grout metal frames built into masonry Work.

O. For non-loadbearing Work allow for deflection between top of walls and structure above. Maintain lateral stability in a manner acceptable to Architect and authorities having jurisdiction. Provide compressible fillers and joint sealers to maintain acoustical performance and fire ratings of wall assembly. The top of walls to be anchored to structure as shown in the drawings.

3.02 REINFORCING, TIE, AND ANCHOR INSTALLATION

A. Provide reinforcing, ties, and anchors for all Work of this Section, including but not limited to, concrete masonry, clay brick veneer, calcium silicate masonry, and cast stone utilizing the appropriate type for each condition, in accordance with requirements of this Section, Section 04 21 11 – Reinforced Masonry, and Cast Stone Institute Technical Manual. Allow at least 1 in. space between masonry and structural members when masonry is tied to structure.

B. Space wall ties to comply with codes and manufacturer's recommendations. Provide at least one tie for every 1.77 sf. of wall area, unless more frequent spacing is indicated or required by codes. Do not space more than 16 in. O.C. vertically and horizontally. Maximum misalignment of bed joints from one wythe to the other shall be 1-1/4 in. Provide ties within 12 in. of wall openings and within 24 in. of wall perimeters and corners. The anchor ties securely to concrete masonry, precast or studs. All fasteners exposed to cavity shall be coated with mastic compatible with the required air barrier system.

C. Provide reinforcing, ties, and anchors for all Work, including but not limited to, concrete masonry, brick masonry, and cast stone masonry using the appropriate specified type for each condition, and in accordance with requirements of Section 04 21 11 - Reinforced Masonry. Cast stone masonry shall be anchored in accordance with the approved manufacturer's written recommendations and the Cast Stone Institute, or as otherwise indicated on the Drawings.

D. Provide continuous joint reinforcing spaced not more than 16 in. O.C. vertically, except space reinforcing at 8 in. O.C. immediately above and below openings and extend this reinforcing at least 2 ft. beyond each jamb. Overlap joints in reinforcing at least 6 in. Do not bridge expansion and control joints, if any. Provide preformed corners and tees.

3.03 LINTEL INSTALLATION

A. Install loose metal lintels shown in the drawings and elsewhere needed.

B. Provide masonry lintels where indicated and wherever openings are shown without another type of lintel. Provide precast concrete, preformed or built-in-place lintels which are adequate for loading conditions encountered. Provide at least 8 in. of bearing at each end. Obtain Architect's approval of masonry lintels used.

3.04 FLASHING INSTALLATION AND COORDINATION

A. Prepare surfaces to receive flashings to be free of projections, loose material, debris, oil, and smooth and dry. Surface and air temperature at time of installation, and 24 hours prior to installation, shall be not less than 25 degrees Fahrenheit. Spray, roll, or brush apply the approved manufacturer's recommended primer at the rate of 250 to 300 square feet per gallon. Allow primer to dry 1 hour before application of membrane. Areas of primer exposed for more than 8 hours or contaminated by dust or debris should be cleaned and re-primed.

B. Apply membrane flashing starting from the lowest point and working upwards in a methodical manner, to install flashing with no wrinkles or air pockets. Use a hand roller to firmly secure membrane to all surfaces. Overlap all seams a minimum of 3 in. Inside and outside corners shall receive a second layer of membrane and shall be sealed with the approved manufacturer's recommended mastic. Install the approved manufacturer's termination bar and sealant continuously along the top edge of the membrane, securely fastened with neoprene washer screws. Trim the leading edge of the flashing membrane to be recessed 1/2 in. from the exterior exposed face of the brick masonry.

C. Provide flashing to protect against the downward flow of water at every obstruction, including, but not limited to, ledges, shelf angles, lintels, door and window heads, sills, and jambs, and elsewhere as indicated or required. Form and install flashing to effectively control and divert water to the exterior. Form at least 4 in. high three-sided pans above lintel end and similar conditions to extend the entire length of the lintel. Make watertight joints and seams overlapped at least 3 in. Extend concealed flashings from outer face of wall through the wall and turned up a minimum of 16 in. on the inside face of the wall when the wall is concealed from view.

D. Coordinate and install reglet indicated in the drawings and where needed. Provide reglet in accordance with requirements of Section 07 62 00 - Sheet Metal Flashing and Trim.

3.05 INSULATION INSTALLATION

A. Mechanically attach insulation to cavity walls or indicated on the drawings per manufacturers recommendations. All panels shall be butted snugly with no gaps greater than 1/4 in. Gaps greater than 1/4 in. shall be filled with the same material. Insulation panels may be applied to cavity walls while air barriers are tacky. Insulation manufacturers shall verify compatibility with air barrier materials.

3.06 TOLERANCES

A. The building facade brick Work relates directly to the buildings structural steel. Line and grade shall therefore be adjusted to any misalignment or translation of the existing building structure. The following allowable installed tolerances are allowable variations from existing conditions and shall not be added to allowable tolerances indicated for other Work.

1. Maximum variation from plumb in vertical lines and surfaces of columns, walls and arises:
   a. 1/8 in. at 10 ft.
   b. 1/4 in. at a story height not to exceed 20 ft.
   c. 3/8 in. at 40 ft. or more.
2. Maximum variation from plumb for external corners, expansion joints and other conspicuous lines:
   a. 1/4 in. at any story or 20 ft. maximum.
   b. 1/2 in. at 40 ft. or more
3. Maximum variation from level of grades for exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines:
   a. 1/4 in. at any bay or 20 ft.
   b. 1/2 in. at 40 ft. or more.
4. Maximum variation from plan location of related portions of columns, walls, and partitions:
   a. 1/2 in. at any bay or 20 ft.
   b. 3/4 in. at 40 ft. or more.
5. Maximum variation in cross-Sectional dimensions of columns and thicknesses of walls from dimensions shown on drawings:
   a. Minus 1/4 in.
   b. Plus 1/2 in.

3.07 REPAIRING, CLEANING AND PROTECTION

A. Remove and replace Work that is loose, chipped, broken or otherwise damaged. Eliminate all evidence of repair. Enlarge voids and holes in mortar joints and point with mortar to exactly match sound adjacent mortar.

B. Clean exposed concrete masonry units by dry brushing at the end of each day's Work. Comply with recommendations of NCMA TEK Bulletin No. 28. Remove and replace Work that cannot be successfully cleaned. Demonstrate cleaning technique on sample panel and obtain Architect's approval before beginning cleaning Work. Do not use muriatic acid or other chemical cleaners without the written permission of the Architect.

C. Protect persons, motor vehicles, surrounding surfaces of buildings being restored, building sites, plants, and surrounding buildings from harm resulting from brick and/or stone restoration work.

1. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of restoration and cleaning work.

D. Prevent mortar from staining the face of surrounding masonry and other surfaces.

1. Cover sills, ledges, and projections to protect from mortar droppings.
2. Keep wall area wet below rebuilding and pointing work to discourage mortar from adhering.
3. Immediately remove mortar in contact with exposed masonry and other surfaces.

3.08 FINAL CLEANING

A. At or near to Substantial Completion of the Work of this Section, final cleaning shall be performed. Polished finish concrete masonry shall be cleaned using Light Duty Concrete Cleaner by Sure Klean. Follow Manufacturer’s cleaning instructions. Brick specific product selection shall be dependent on final selection of brick and in strict accordance with manufacturer's instructions. Materials shall not be applied when temperatures are below 45° F. Temperatures shall not fall below 32° F in the 24-hour period after cleaning.

B. A test area of wall surface from ten to twenty square feet in size shall be cleaned with the recommended masonry cleaning material for inspection and approval by the Architect. Samples of adjacent non-masonry material shall be tested for possible reaction with the diluted cleaning materials. Such samples shall be available for inspection by the Architect. Protection to be provided as necessary and required by the Architect to all non-masonry surfaces during the cleaning process.

C. Follow manufacturer's recommended procedures for preparation, precautions, application, and handling of masonry cleaning products. Do not use muriatic acid or other chemicals without written permission of the Architect.

3.09 RUBBISH REMOVAL

A. The Subcontractor of this Section shall stockpile and drop daily all wastes and debris at areas designated by the General Contractor.

B. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION

SECTION 04 21 11

REINFORCED UNIT MASONRY

(Part of the Work of Section 04 20 00 – Unit Masonry, Filed Sub-Bid Required)

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. The Contract Documents include the Drawings as enumerated on the Title Drawing, the general provisions of Contract, including General and Supplemental Conditions, and the provisions of this Project Manual and Addenda represent and describe the work and requirements of the Project.

1.02 FILED SUB-BID REQUIREMENTS

A. The Work of this Section shall be included as Part of the Work of Section 04 20 00 – Unit Masonry, stipulated as a Filed Sub-Bid under Paragraph D, Item 2 of the Form for General Bid.

B. The Sub-Bidder of Section 04 20 00 – Unit Masonry shall examine all Drawings and all Sections for requirements affecting the Work of this Section as shown primarily in the following drawings:

1. Lincoln Elementary School: A1.01 through A12.01.
2. Thorndyke Road Elementary School: A1.01 and A9.01.

C. The Sub-Bidder of Section 04 20 00 – Unit Masonry shall examine other drawings and specification sections that could affect the Work of this Section as it relates to coordination. The other drawings are the following:

1. Lincoln Elementary School: D1.01 through D7.01; S0.01 through S1.02; FP1.01 through FP1.03; DP1.01 and P1.01; ED.1 through FA.2; DH1.01 and H1.01; VT.01.
2. Thorndyke Road Elementary School: D1.01 through D7.01; S0.01 through S2.01; FP1.01 through FP1.03; DP1.01 through P1.02; ED.0 through FA.3; H1.01 and H1.03; VT.02.

1.03 DESCRIPTION OF WORK

A. The Work of this Section shall include, but not be limited to, furnishing and installation of the following:

1. Vertical reinforcing bars
2. Mortar and grout materials and mixes
3. Staging, scaffolding, hoists, and related equipment

B. The extent of each type of reinforced unit masonry Work shall be as defined in the most recent edition of the International Building Code, IBC, including most recent amendments thereto, or as otherwise indicated in the Drawings.

1.04 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
2. Section 02 41 13 - Selective Demolition
3. Section 03 54 13 - Cementitious Underlayment
4. Section 04 20 00 – Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.05 QUALITY ASSURANCE

A. Allowable tolerances shall be in accordance with the requirements of Section 04 20 00 – Unit Masonry.

B. Reinforced concrete masonry construction shall conform to all requirements of "Specification for Masonry Construction (ACI - ASCE 530.1)" published by the American Concrete Institute, except as modified by the supplemental requirements contained herein.

C. All Work shall conform to the requirements of the most recent edition of the International Building Code, IBC, including most recent amendments thereto, and applicable referenced standards therein.

1.06 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures and in accordance with requirements of the Contract Documents.

B. Submit shop drawings for fabrication, bending, and placement of reinforcement bars. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures". Show bar schedules, diagrams of bent bars, stirrup spacing, lateral ties and other arrangements and assemblies necessary for fabrication and placement of reinforcement for unit masonry Work. Shop drawings shall include wall elevations of the buildings indicating rebar placement locations and sizes.

C. Submit manufacturer's specifications for each type of masonry unit, accessory, and other manufactured product, including certifications that each type complies with specified requirements. Include instructions for handling, storage, installation, and protection.

D. Submit samples of load bearing blocks, ties, reinforcing, and other items as may be required by Architect.

1.07 JOB CONDITIONS

A. The Work of this Section shall be provided in accordance with requirements of Section 04 20 00 – Unit Masonry.

1.08 TESTING

A. Field inspection and testing of Work performed under this Section shall be in accordance with testing requirements of International Building Code, most recent Edition, as amended, for Special Inspections and the Owner's Statement of Special Inspections. The Owner's testing agency shall be present when the Work of this Section is being constructed and assisted while conducting their Work. Coordinate with the Owner's designated representative and the testing agency to verify requirements for testing of Work performed under this Section.

1.09 CUTTING AND CORING

A. The installation of new Work that requires cutting and coring of floors, walls, and roofs with dimensions 5-1/2 in. or less shall be performed by the Subcontractor of this Section. The General Contractor shall cut and core floors, walls, and roofs with dimensions not indicated by the Subcontractor of this Section.

1.10 SCAFFOLDING AND EQUIPMENT

A. The Subcontractor of this Section shall provide, maintain, and safely remove when no longer required, interior and exterior staging, scaffolding, hoists, and all other related equipment to comply with all applicable Federal, State, and local regulations and codes.

1.11 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner's Project Manager, Architect, and related subcontractors.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Refer to Section 04 20 00 - Unit Masonry for hollow load bearing concrete masonry units and other masonry materials and accessories not included in this Section.

B. Hollow Load Bearing CMU: ASTM C90 grade N, moisture-controlled units, normal weight, two cell units. F'm = 2,000 psi.

C. Reinforcement Bars: Provide deformed bars of following grades complying with ASTM A 615, except as otherwise indicated.
   1. Provide Grade 40 for bars, except as otherwise indicated.
   2. Provide Grade 60 for bars No. 4 to No. 18, except as otherwise indicated.
   3. Shop-fabricate reinforcing bars which are shown to be bent or hooked.

D. Ties and Horizontal reinforcement: Refer to Section 04 20 00 – Unit Masonry.

2.02 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I, except as otherwise approved by Architect. Provide natural color or white cement to produce the required mortar color.

B. Lime: ASTM C 207, special finishing hydrated line, non-air entrained.

C. Aggregate for Mortar: Sand, ASTM C 144 or ASTM C 404, Size No. 2, except for joints. 1/4 inch and less (if any) use aggregate graded with 100 percent passing the No. 16 sieve.

D. Fine Aggregate for Grout: Sand, ASTM C 33 or ASTM C 404, Size No. 1.

E. Coarse Aggregate for Grout: ASTM C 404, Size No. 8 or Size No. 89.

2.03 MORTAR AND GROUT MIXES

A. Measurement: Use methods which shall ensure that specified proportions are controlled and accurately maintained. Measure aggregate materials in a damp, loose condition.

B. Mortar: ASTM C 270, and the following:
   1. Use Type PL mortar proportioned by volume; one-part Portland cement, 1/4 to 1/2 part-time, and sand equal to 2-1/4 to 3 times the sum of the volume of cement and lime materials. (Type S, with a 28-day compressive strength of 2000 psi.)

C. Grout: ASTM C 476, and the following:
   1. Fine Grout: Proportion by volume; one part Portland cement, zero to one-tenth part lime and sand equal to 2-1/4 to 3 times the sum of the volumes of cement and lime materials. 2500 psi minimum strength. Verify 28-day compressive strength by testing.
   2. Coarse Grout: Proportion by volume; one part Portland cement, zero to one-tenth part lime, and fine aggregate (sand) equal to 2-1/4 to 3 times the sum of the volumes of cement and lime materials, and 3/8 in. (pea stone) aggregate equal to one to two times the sum of the volumes of cement and lime materials. 2500 psi minimum strength. Verify 28 days compressive strength by testing.

D. Mixing: Combine and mix cement, lime, water, and aggregates for a minimum of five minutes in a mechanical batch mixer. For mortar, add as much water as is required for Workability. Mortar may be re-tempered only once by adding water and remixing to maintain acceptable workability. Do not use mortar or grout which has begun to set or if more than 2-1/2 hours have elapsed after initial mixing.
   1. Mix grout to have a slump of ten inches plus or minus one inch, at time of placement.

E. Do not add air-entraining agents or other admixtures to mortar or grout materials.

2.04 TESTING AND MASONRY STRENGTH

A. The Masonry Subcontractor shall determine the ultimate net compressive strength of masonry (f'm) by either unit tests or prism tests and submit test results to the Architect prior to first use in the structure. See general notes for requirements.

B. The cost of additional testing and inspection required because of changes in materials or proportions shall be paid by the Masonry Subcontractor.

PART 3 - EXECUTION

3.01 PLACING REINFORCEMENT

A. Clean reinforcement of loose rust, mill scale, earth, ice, or other materials which shall reduce bond to mortar or grout. Do not use reinforcement bars with kinks or bends not shown on drawings or final shop drawings, or bars with reduced cross-Section due to excessive rusting or other causes.

B. Position reinforcement accurately at the spacing shown. Support and secure vertical bars against displacement. Place horizontal reinforcement as the masonry Work progresses. Where vertical bars are shown in proximity, provide a clear distance between bars of not less than the nominal bar diameter or 1 in. (whichever is greater).

1. For columns, piers and pilasters, provide clear distance between vertical bars as indicated, but not less than 1-1/2 times the nominal bar diameters or 1-1/2 in., whichever is greater. Provide lateral ties as indicated.

C. Splice reinforcement bars where shown; do not splice at other points unless acceptable to the Architect. Provide lapped splices, unless otherwise shown. In splicing vertical bars or attaching to dowels, lap ends, place in contact and wire tie.

1. Provide not less than minimum lap shown, or if not shown, use 48 bar diameters.

D. For multiple wythe walls, embed prefabricated horizontal joint reinforcing as the Work progresses, with a minimum cover of 5/8 in. on exterior face of walls and 1/2 in. at other locations. Lap units not less than 6 in. at ends. Use prefabricated "L" and "T" units to provide continuity at corners and intersections. Cut and bend units as recommended by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.

E. Anchor reinforced masonry Work to supporting structure as indicated on drawings.

F. Vertical Reinforcing: Place one bar per cell (size as noted on the structural drawings) at spacing noted on the structural drawings, plus at corners and each side of openings as minimum reinforcement unless shown otherwise.

G. CMU Bond Beams: Provide minimum two No. 5 bars horizontally at top and bottom or directed by Structural Engineer.

H. The horizontal joint reinforcing for 6 in. thick and smaller CMU shall be welded ladder type, No. 9 gauge diameter and No. 9 gauge cross wire. Ties and joint reinforcing shall be hot-dipped galvanized, in accordance with ASTM A 153.

I. Horizontal joint reinforcing for 8 in. thick and wider CMU shall be welded tri-rod truss type, No. 9 gauge side pods and No. 9 gauge cross wire. Ties and joint reinforcing shall be hot-dipped galvanized, in accordance with ASTM A 153.

J. Horizontal joint reinforcing shall be provided for all CMU walls spaced not more than 16 in. O.C. vertically, except space reinforcing at 8 in. O.C. immediately above and below openings and extend this reinforcing at least 2 ft. beyond each jamb. Overlap joints in reinforcing at least 8 in. Do not bridge expansion and control joints, if any. Provide preformed corners and tees.

3.02 INSTALLATION - GENERAL

A. Refer to Section 04 20 00 - Unit Masonry for general installation requirements of unit masonry and mortar bedding and jointing requirements, except where specifically modified by this Section.

3.03 INSTALLATION OF REINFORCED CONCRETE UNIT MASONRY

A. General:

1. Do not wet concrete masonry units.

B. Lay CMU units with full-face shell and full-web mortar beds. Fill vertical head joints (end joints between units) solidly with mortar from face of unit to a distance behind face equal to not less than the thickness of longitudinal face shells. Maintain head and bed joints widths shown, or if not shown, provide 3/8 in. joints.

C. Maintain vertical continuity of core or cell cavities, which are to be reinforced and grouted, to provide minimum clear dimensions indicated and to provide minimum clearance and grout coverage for vertical reinforcement bars. Keep cavities free of mortar. Solidly bed webs in mortar where adjacent to reinforced cores or cells.

D. Where horizontal reinforced beams (bond beams) are shown, use special units to allow for placement of continuous horizontal reinforcement bars. Place small mesh expanded metal lath or wire screening in mortar joints under bond beam courses over cores or cells of non-reinforced vertical cells or provide units with solid bottoms. The use of other materials must be approved by the Architect prior to use.

E. Grouting:

1. Use "Fine Grout" for filling 4 in. spaces or smaller in both horizontal directions.
2. Use "Course Grout" for filling 4 in. spaces or larger in both horizontal directions.
3. Grouting Technique: Use Low-Lift grouting techniques only.

F. Grout shall be placed in masonry at a minimum temperature of 70 degrees F and a maximum temperature of 120 degrees F. The grouted masonry shall be maintained above 32 degrees F for 24 hours following placement of grout.

G. Place and tie vertical reinforcement prior to laying of CMU. Extend above elevation of maximum pour height to allow for proper splicing. Support in position at vertical intervals not exceeding 24 in. with rebar spacers.

H. Lay CMU to maximum pour height. Do not exceed 4 ft. height, or if bond beam occurs below 4 ft. height stop pouring at course below bond beam.

I. Pour grout using container with spout or by chute. Rod or vibrate grout during placing. Place grout continuously; do not interrupt pouring of grout for more than one hour. Terminate grout pour 1-1/2 in. below top course of pour.

J. Bond Beams: Stop grout in vertical cells 1-1/2 in. below bond beam course. Place horizontal reinforcement in bond beams; lap at corners and intersections as shown. Place grout in bond beam course before filling vertical cores above bond beam.

K. Provide cleanout holes in first course at all vertical cells which are to be filled with grout.

1. Use units with one face shell removed and provide temporary support for units above, or use header units with concrete brick supports, or cut openings in one face shell.

L. Construct masonry to full height of maximum grout pour specified, prior to placing grout.

1. Limit grout lifts to heights recommended by the National Concrete Masonry Association, NCMA, for the type of units, reinforcing and grout used in the Work, but in no case exceed 160 bar diameters.
2. Place vertical reinforcement before grouting. Place before or after laying masonry units, as influenced, or controlled by job conditions. Tie vertical reinforcement to dowels at base of masonry were shown and thread CMU over or around reinforcement. Support vertical reinforcement at intervals not exceeding 160 bar diameters.
3. Where individual bars are placed after laying masonry, place wire loops extending into cells as masonry is laid and loosen before mortar sets. After insertion of reinforcement bar, pull loops and bar to proper position and tie free ends.
4. Place horizontal beam reinforcement as the masonry units is laid.

M. Prior to grouting, inspect and clean grout spaces. Remove dust, dirt, mortar droppings, loose pieces of masonry and other foreign materials from grout spaces. Clean reinforcement and adjust to proper position. Clean top surface of structural members supporting masonry to ensure bond. After final cleaning and inspection, close cleanout holes and brace closures to resist grout pressures.

N. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist displacement of masonry units and breaking of mortar bond. Install shores and bracing, if required, before starting grouting operations.

O. Place grout by pumping into grout spaces unless alternate methods are acceptable to the Architect.

1. Limit grout pours to Sections which can be completed in one working day with not more than one hour interruption of pouring operation. Place grout in lifts which do not exceed 4'. Allow not less than 30 minutes, nor more than one hour between lifts of a given pour. Rod or vibrate each grout lift during pouring operation.
2. Place grout in lintels or beams over openings in one continuous pour.

P. Where bond beam occurs more than one course below top of pour, fill bond beam course to within 1 in. of vertically reinforced cavities, during construction of masonry.

Q. When more than one pour is required to complete a given Section of masonry, extend reinforcement beyond masonry as necessary for proper splicing. Pour grout to within 1-1/2 in. of top course of first pour. After grouted masonry is cured, lay masonry units and place reinforcement for second pour Section before grouting. Repeat sequence if more pours are required.

3.04 INSPECTION

A. Field inspection and testing of Work performed under this Section shall be in accordance with testing requirements of International Building Code, most recent Edition, as amended, for Special Inspections and the Owner's Statement of Special Inspections. The Owner's testing agency shall be present when the Work of this Section is being constructed and assisted while conducting their Work. Coordinate with the Owner's designated representative and the testing agency to verify requirements for testing of Work performed under this Section.

3.05 RUBBISH REMOVAL

A. The Subcontractor of this Section shall stockpile and drop daily of all wastes and debris at areas designated by the General Contractor.

B. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION

SECTION 05 40 00

COLD-FORMED METAL FRAMING AND EXTERIOR SHEATHING

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:

1. Exterior non-load-bearing wall framing
2. Horizontal soffit framing
3. Exterior sheathing

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
2. Section 02 41 13 - Selective Demolition
3. Section 03 54 13 - Cementitious Underlayment
4. Section 04 20 00 – Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Member in good standing of the Steel Framing Industry Association (SFIA).
   1. Products to be certified under an independent third-party inspection program administered by an agency accredited by IAS to ICC-ES AC98 IAS Accreditation Criteria for Inspection Agencies.

B. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.

C. Professional Engineer Qualifications: A professional structural engineer who is licensed to practice in the Commonwealth of Massachusetts and who is experienced in providing engineering services. Engineering services are defined as those performed for installations of cold-formed metal framing required for this project.

D. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

E. Product Tests: Mill certificates or data from a qualified independent testing agency, indicating steel sheet complies with requirements, including base-steel thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

F. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Steel Framing Industry Association (SFIA).

G. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
   2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

H. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by, and displaying a classification label from, a testing and inspecting agency acceptable to authorities having jurisdiction.

I. Comply with AISI Specifications and Standards.
   1. AISI S100 “North American Specification for the Design of Cold-Formed Steel Structural Members”.
   2. AISI S200 “North American Standard for Cold-Formed Steel Framing – General Provisions”.
   3. AISI S201 “North American Standard for Cold-Formed Steel Framing – Product Standard”.
   4. AISI S211 “North American Standard for Cold-Formed Steel Framing – Wall Stud Design”.
   5. AISI S212 “North American Standard for Cold-Formed Steel Framing – Header Design”.
   6. AISI S213 “North American Standard for Cold-Formed Steel Framing – Lateral Design”.
   7. AISI “Code of Standard Practice for Cold-Formed Steel Structural Framing”.

1.05 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures and in accordance with requirements of the Contract Documents.

B. Submit manufacturers product literature for all items with schedule of use, installation instructions, and recommendations for each material used.

C. Submit manufacturers certificates demonstrating compliance with applicable code for fire-rated assemblies.

D. Shop Drawings: Provide shop drawings prepared by cold-formed metal framing manufacturer including but not limited to the following:
   1. Layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
   2. Reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
   3. Exterior sheathing vertical joints at 30 ft. O.C. max. and horizontal joints at each floor level or at each CFMF deflection tracks.

E. Delegate design submittal for cold-formed metal framing as indicated to comply with performance requirements and design criteria, including analysis/calculation data bearing the seal and signature of the Professional Structural Engineer registered in the Commonwealth of Massachusetts.

F. Provide welding certificates.

G. Provide qualification data for Professional Structural Engineer licensed in the Commonwealth of Massachusetts.

H. Provide product certificates for each type of code compliance certification for studs and tracks.

I. Provide product test reports from a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:
   1. Steel sheet
   2. Expansion anchors
   3. Power-actuated anchors
   4. Mechanical fasteners
   5. Vertical deflection clips
   6. Miscellaneous structural clips and accessories

J. Provide evaluation reports for cold-formed steel framing:
   1. Metal stud manufacturers must have a third-party evaluation report for its products that are reviewed to the local building code or its model code (IBC 2009 and AISI S100 or IBC 2012 and AISI S100 or IBC 2015 and AISI S100).

1.06 DELIVERY, STORAGE AND HANDLING

A. Protect and store cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling required in AISI's "Code of Standard Practice".

1.07 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner's Project Manager, Architect, and related subcontractors.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Provide cold-formed metal framing from one of the following manufacturers that meet or exceed the requirements of this specification:
   1. Clark Dietrich Building Systems
   2. Marino / WARE
   3. Aegis Metal Framing
   4. EB Metal

2.02 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified Professional Structural Engineer, as defined in Section 01 40 00 - Quality Requirements, to design cold-formed steel framing.

B. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.
   1. Design Loads: As indicated in Structural Drawing S0.01
   2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
      a. Exterior Load-Bearing Wall Framing: Horizontal deflection of 1/720 min. of the wall height.
      b. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/720 min. of the wall height.
      c. Exterior Soffit Framing: Vertical deflection of 1/120 of the span for live loads and 1/240 for total loads of the span.
   3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
   4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
      a. Upward and downward movement of 1/2 inch.
   5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

C. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200, and the following:
   1. Wall Studs: AISI S211.
   2. Headers: AISI S212.
   3. Lateral Design: AISI S213.

D. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings from an applicable testing agency.
   1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency acceptable to authorities having jurisdiction.

2.03 COLD-FORMED METAL FRAMING

A. Framing Members, General: Comply with ASTM C 955 for conditions indicated.

B. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:
   1. Grade: Required for structural performance.
   2. Coating: G90

C. Steel Sheet for Vertical Deflection Clips: ASTM A 1003/A 1003M, ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
   1. Grade: Required for structural performance.
   2. Coating: G90

D. Environmental Product Declaration: EPD10056

2.04 NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
   1. Minimum Base-Steel Thickness: 0.0329 inch
   2. Flange Width: 1-3/8 inches

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
   1. Minimum Base-Steel Thickness: Matching steel studs
   2. Flange Width: 1-1/4 inches.

C. Headers and Jambs - Heavy-Duty Stud: Manufacturer's proprietary shape used to form header beams and jambs, columns, or posts, of web depths indicated, unpunched, with stiffened flanges and as follows:
   1. Minimum Base-Steel Thickness: Matching steel studs
   2. Web and Flange Widths, Type HDS: 3-5/8 x 3 x 1-1/16 x 3/4 inch
   3. Web and Flange Widths, Type HDSC: 3-1/2 x 3-1/16 x 2 inches

D. Vertical Deflection Clips: Manufacturer's standard bypass clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
   1. Minimum Base-Steel Thickness: FastClip Slide Clip; 0.0677 inch.

E. Deflection Track and Firestop Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thicknesses not less than indicated for studs and in width to accommodate depth of studs:

1. Minimum Base-Steel Thickness: 0.0428 inch
2. Flange Width: 1 inch plus the design gap for one-story structures

F. Slotted Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; punched with vertical slots in both legs. Studs should be positively attached to deep-leg track using vertical slots while allowing free vertical movement. Legs designed to support horizontal and lateral loads and transfer them to the primary structure, as follows:

1. Standard Leg: 2-1/2 inches.
2. Standard Vertical Slot in Leg: 1-1/2 inches
3. Minimum Yield Strength and Thickness: 33 ksi; 0.0329 inch

G. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure. Install a continuous row of bridging, composed of 1-1/2 inch (38 mm) cold-formed channel secured to each stud with clip angle or Spazzer 5400, at upper-most knockout, not more than 12 inches (305 mm) from top of wall.

1. Minimum Base-Steel Thickness: 0.0428 inch
2. Flange Width: 1 inch plus the design gap for one-story structures

H. U-Channel Assembly: Manufacturer's standard-length U-Channel for lateral bracing for exterior curtain wall framing, loadbearing walls, or high interior partitions constructed of structural studs.

1. U-Channel Size: 1-1/2 inches.
2. U-Channel Minimum Base-Steel Thickness:0.0538 inch.

I. Bridging and Spacer Bar:

1. Minimum Base-Steel Thickness: 0.0538 inch.
2. Size: 1-1/4 x 1-1/4 x 50 inches long, pre-notched at 12, 16 and 24 inches on centers.

J. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
   a. Minimum Base-Steel Thickness: 0.0329 inch
   b. Flange Width: 1 inch plus the design gap for one-story structures
2. Inner Track: Of web depth indicated, and as follows:
   a. Minimum Base-Steel Thickness: 0.0428 inch
   b. Flange Width: dimension equal to sum of outer deflection track flange width plus 1 inch.

K. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

1. Minimum Base-Steel Thickness: 0.0677 inch

L. Environmental Product Declaration: EPD10056

2.05 HORIZONTAL SOFFIT FRAMING

A. Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:

1. Minimum Base-Steel Thickness: 0.0329 inch
2. Flange Width: 1-5/8 inches, minimum.
3. Environmental Product Declaration: EPD10056

2.06 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
8. Stud kickers and knee braces.
9. Joist hangers and end closures.
10. Hole-reinforcing plates.
11. Backer plates.

C. Provide 3-1/2 in. CFMF z-furring, 12-gauge, galvanized steel ASTM A653, as manufactured by Clark Dietrich or equal by Marino/Ware or Aegis Metal Framing. The horizontal CFMF z-furring shall comply with the following properties:

1. 1-1/4 in. wide flange for easy screw attachment
2. ”Toed-in” leg to grip rigid insulation positively
3. 10 ft. standard length

2.10 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts, carbon-steel nuts, and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.

C. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 as appropriate for the substrate.

1. Uses: Securing cold-formed steel framing to structure.
2. Type: Torque-controlled expansion anchor
3. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
4. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

D. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.

1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.11 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A 780/A 780M

B. Cement Grout: Portland cement, ASTM C 150/C 150M, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

C. Nonmetallic, Non-shrink Grout: Factory-packaged, nonmetallic, noncorrosive, non-staining grout, complying with ASTM C 1107/C 1107M, and with a fluid consistency and 30-minute working time.

D. Shims: Load bearing, high-density, multi-monomer, non-leaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.

E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 in. thick, selected from manufacturer's standard widths to match width of bottom track or rim track members required.

2.12 FABRICATION

A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.

a. Comply with AWS D1.3/D1.3 M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
b. Locate mechanical fasteners and install according to Shop Drawings, with screws penetrating joined members by no fewer than three exposed screw threads.

4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.

C. Tolerances: Fabricate assemblies' level, plumb, and true to line to a maximum allowable variation of 1/8 in. in 10 feet 1:960) and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 in. from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 in.

2.07 EXTERIOR SHEATHING

A. Provide exterior sheathing Securock Glass-Mat Sheathing Firecode X, as manufactured by United States Gypsum Company, or equal by Dens-Glass Gold or Georgia/Pacific, for installation as exterior wall sheathing. Panels shall b non-combustible and comply with requirements of ASTM C 1396, C931, C 1177, C 1278, and the following material and performance characteristics:

1. Thickness: 5/8 in.
2. Weight: 3 PSF
3. Flame Spread: 0, in accordance with ASTM E 84
4. Smoke Developed: 5, in accordance with ASTM E 84
5. Mold Resistance: 10, in accordance with ASTM D 3273-00
6. Flexural Strength: 189 ft. lbs.
7. Edges: Square

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, conditions, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that required to obtain fire-resistance ratings indicated. Protect remaining fire-resistive materials from damage.

C. Install load-bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 in. to ensure a uniform bearing surface on supporting concrete or masonry construction.

D. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.03 INSTALLATION, GENERAL

A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed steel framing in accordance with ASTM C 1007 and AISI S200 “North American Standard for Cold-Formed Steel Framing – General Provisions”, and manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
   1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 in.

D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
   1. Cut framing members by sawing or shearing; do not torch cut.
   2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
      a. Comply with AWS D1.3/D1.3 M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
      b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and support to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.

H. Install insulation, specified in Section 07 21 00 - Thermal Insulation, in framing-assembly members, such as headers, sills, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

3.04 NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.

B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: As indicated on Drawings.

C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single deep-leg deflection tracks and anchor to the building structure.
2. Install double deep-leg deflection tracks and anchor outer tracks to building structure.
3. Connect vertical deflection clips to studs and anchor to building structure.
4. Connect drift clips to cold-formed steel metal framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Channel Bridging: Cold-formed steel channel welded or mechanically fastened to webs of punched studs.
2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Bridging is not required in the top row when using proprietary slotted deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

1. Install solid blocking at centers indicated on Shop Drawings

G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.05 ERECTION TOLERANCES

A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.06 FIELD QUALITY CONTROL

A. Testing: The General Contractor shall engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds shall be subject to testing and inspecting.

C. The testing agency shall report test results promptly and in writing to the General Contractor and Architect.

D. Cold-formed steel framing shall be considered defective if it does not pass tests and inspections.

E. Additional testing and inspecting, shall be the Trade Contractor’s expense, shall be performed to determine compliance of replaced or additional work with specified requirements.

3.10 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

3.11 ADJUSTING, CLEANING, AND PROTECTION

A. Cut, patch, repair and point Work as needed to accommodate other Work and to repair cracks and defective surfaces. Eliminate blisters, check cracking, dried out spots and all other defects and problem areas. Repair minor damage to eliminate all evidence of repair. Leave Work including trims and accessories ready for finishing.

B. Clean adjacent surfaces using non-abrasive materials and methods to make adjacent Work in “as-found” condition, undamaged by plaster operations. Remove and replace Work that cannot be successfully cleaned or repaired.

C. Provide temporary protection to ensure completed Work is without damage or deterioration at time of final acceptance. Remove protections and re-clean as necessary immediately before final acceptance.

3.12 RUBBISH REMOVAL

A. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 50 00 - Temporary Facilities and Controls.

END OF SECTION

SECTION 05 50 00

METAL FABRICATIONS
(Filed Sub-Bid Required)

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 FILED SUB-BID REQUIREMENTS

A. Sub-bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the Enter Name and Address for Place of Bid Openging at time and place stipulated in the "Invitation to Bid/Notice to Contractors".

Name of Sub-Bidder:

Project: Worcester Public Schools ADA Upgrades for Challenge & Reach, Gerald Creamer, Lincoln, and Thorndyke Schools.

Sub-Bid for Section: 05 50 00 – Metal Fabrications

B. Each sub-bid submitted for work under this Section shall be on forms furnished by the City of Worcester as required by Section 44F of Chapter 149 of the General Laws, as amended. Sub-Bid forms may be obtained at the Enter Name and Address of location where forms may be obtained in person, or by written request.

C. Sub-bids filed with the City of Worcester shall be accompanied by a BID BOND or CASH or CERTIFIED CHECK or a TREASURER'S or CASHIER"S CHECK issued by a responsible bank or trust company payable to the City of Worcester in the amount of five (5) percent of the bid. A sub-bid accompanied by any other form of bid deposit than those specified will be rejected.

D. The Sub-Bidder of this Section shall include Work of the following Sections:

1. 05 51 00 – Metal Stairs
2. 05 52 13 – Pipe and Tube Railings
3. 05 55 16 – Metal Stair Nosing

E. The Sub-Bidder of this Section shall examine all drawings and specification sections for requirements affecting the Work of this Section as shown primarily in the following drawings:

1. Lincoln Elementary School: A1.01 through A12.01.
2. Thorndyke Road Elementary School: A1.01 and A1.02.

F. The Sub-Bidder of this Section shall examine other drawings and specification sections that could affect the Work of this Section as it relates to coordination. The other drawings are the following:

1. Lincoln Elementary School: D1.01 through D7.01; S0.01 through S1.02; FP1.01 through FP1.03; DP1.01 and P1.01; ED.1 through FA.2; DH1.01 and H1.01; VT.01.
2. Thorndyke Road Elementary School: D1.01 through D7.01; S0.01 through S2.01; FP1.01 through FP1.03; DP1.01 through P1.02; ED.0 through FA.3; H1.01 and H1.03; VT.02.

1.03 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:

1. Bearing plates, leveling plates, and rough hardware is required to complete the Work of this Section.
2. Bent plates, clip angles, and metal reveals, not specifically sized by length, width, thickness, or weight on structural drawings.
3. Items indicated as "by Metal Fabrications" on the structural drawings.
4. Hot dip galvanizing and shop priming of miscellaneous metal materials.
5. Steel angle, steel plate and channel at top of CMU wall as shown on structural drawings.
6. Seismic clips as shown on structural drawings.
7. Galvanized angle at CMU wall as shown on structural drawings.

B. Items to be Furnished Only: Furnish the following items for installation by the designated Sections:

1. Section 04 20 00 – Unit Masonry:	Loose steel angle lintels unless otherwise indicated as masonry bond beams at all masonry openings to include anchor bolts, blocking, plates, metal reveals for cast stones, and ties built into masonry.
2. Section 05 12 00 – Structural Steel Framing	Masonry clip angles

1.04 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
2. Section 02 41 13 - Selective Demolition
3. Section 03 54 13 - Cementitious Underlayment
4. Section 04 20 00 – Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical

17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.05 QUALITY ASSURANCE

A. Reference Standards:

1.	ASTM A36:	Specification for Structural Steel.
2.	ASTM A569:	Specification for Steel, Carbon (0.15 maximum percent), Hot-rolled Sheet and Strip, Commercial Quality.
3.	ASTM A123:	Specification for Zinc (hot galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged steel shapes, Plates, Bars and Strip.
4.	ASTM A143:	Practice for Safeguarding against Embrittlement of Hot-Dip Galvanized Structural Steel Products and the Procedure for Detecting Embrittlement.

B. Provide the services of a Professional Engineer, registered in the State of Massachusetts to design and certify that the Work of this Section meets or exceeds the performance requirements specified in this Section. Engineer shall be experienced in providing engineering services of the kind indicated that have resulted in the successful installation of metal fabrications similar in material, design, and extent to that indicated for this project.

1. Items requiring an engineers' certification include, but are not limited to, the following:
    a. Ladders
    b. Miscellaneous bearing plates
    c. Support and framing for operable partitions.
    d. Counter support brackets
    e. Rooftop galvanized steel posts and stainless-steel wire mesh
    f. Bent plates and roof edge angles.

C. Shop fabricates work to the greatest extent possible. Clearly label pieces in shop to facilitate field assembly.

D. Perform welding in compliance with American Welding Society Code.

E. Certifications:

1. Submit certification that the shop painting has been done in accordance with specifications.
2. Submit certificate of compliance from galvanizer.

1.06 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures and in accordance with requirements of the Contract Documents.

B. Submit large scale shop drawings for fabrication, installation, and erection of all parts of the Work. Provide plans, elevations, and details of anchorages, connections, and accessory items.

C. Take accurate field measurements before preparing shop drawings and fabrication. Allow for field cutting and fitting where taking field measurements before fabrication is not possible. Do not field cut or fit items which have been hot-dipped galvanized after fabrication.

D. Submit professionally prepared calculations and certification of the performance of this Work. Show how design load requirements and other performance criteria have been satisfied. Calculations shall be stamped and signed by a professional Engineer registered in the Commonwealth of Massachusetts.

1.07 DELIVERY, STORAGE AND HANDLING

A. All materials shall be carefully handled and stacked to prevent deformation or damage. All miscellaneous steel members shall be carefully stored on substantial timbers and blocking, so arranged that the steel shall be free from the earth and properly drained, preventing any spattering or accumulation of water in or about the steel. Care shall be taken to prevent damage to the shop coat of paint and prevent the accumulation of mud dirt or other foreign matter on the steel. Such accumulation shall be completely removed prior to erection.

1.08 PROJECT CONDITIONS

A. Do not permit use of ladders, handrails, guardrails, counters, or other Work until Work is completely and fully installed and ready to assume its intended design loads. Do not permit overloading of any miscellaneous metal system.

1.09 SOURCE QUALITY CONTROL

A. The registered engineer shall make periodic visits to the site to inspect and test as necessary the stairs, handrail, and other metal Work assemblies. After completion of the Work and based on these inspections, an affidavit stamped with the seal of the engineer is to be issued. The affidavit shall state that the Work has been installed in accordance with his/her design.

1.10 CUTTING AND CORING

A. The installation of new Work that requires cutting and coring of floors, walls, and roofs with dimensions 5-1/2 in. or less shall be performed by the Subcontractor of this Section. The General Contractor shall cut and core floors, walls, and roofs with dimensions not indicated by the Subcontractor of this Section.

1.11 SCAFFOLDING AND EQUIPMENT

A. The Subcontractor of this Section shall provide, maintain, and safely remove when no longer required, interior and exterior staging, scaffolding, hoists, and all other related equipment to comply with all applicable Federal, State, and local regulations and codes.

1.12 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner’s Project Manager, Architect, and related subcontractors.

PART 2 – PRODUCTS

2.01 MATERIALS AND PRODUCTS

A. Steel Shapes: Steel shapes shall conform to the requirements of Standard Specifications for Structural Steel, ASTM A – 36. All necessary holes and sinkage's shall be provided for attaching hardware or other items, and all anchorage for attachment to adjacent construction shall be included.

B. Steel Tubing: ASTM A500 or A501, hot or cold rolled.

C. Steel Sheet: ASTM A366, A570 or A611, of grade required for design loading.

D. Steel Pipe: ASTM A53, black schedule 40 or 80 for 3 in. diameter pipe and under and schedule 80 for all pipe over 3 in. in diameter. Type and grade necessary to achieve design loading.

E. Iron Castings: ASTM A47 or A48, grade and class are manufacturer's option.

F. Grout: Pre-mixed, non-staining, non-corrosive, non-shrink, non-metallic cement-based grout requiring only the addition of water. Grout shall exhibit shrinkage compensation characteristics in both the plastic and hardened states, and conform with ASTM C1107, "Grade C", CRD-C621-91, Standard Specification for Packaged Dry Hydraulic Grout – Non-Shrink. One of the following grouts, or Engineer approved substitute, may be used:

1. Five Star Grout 100 by Five Star Products Inc.
2. SikaGrout 212, as manufactured by Sika Corporation.
3. Masterflow 928 by Master Builders, Inc.

G. Bolts and Fasteners: ASTM A307 and other types as appropriate and approved by Architect.

H. Concrete: Comply with requirements of Section 03 30 00 – Cast-in-Place Concrete.

I. Shop Paint: Shop paint shall be Modified Alkyd primer equal to Tnemec No. 10-99G Green Metal Primer, Dupont 681 FD Primer, or Hempel Primer 1205.

J. Field Painting: Surface preparation and field painting shall be as specified in Section 09 91 13 – Painting.

K. Aluminum: Provide alloy and temper recommended by aluminum producer or finisher for the type of use and finish indicated:

1. Extruded bar and shapes: ASTM B 221, 6061-T6, 6063-T6.
2. Extruded pipe and tube: ASTM B 429, 6063-T6.
3. Drawn Seamless tube: ASTM B 483, 6063-T832.
4. Plate and sheet: ASTM B209, 3003-H14.

L. Expansion Fastening Systems: Expansion bolts shall be HILTI KWIK bolts or equal by Powers Fastening, Inc. or ITW Ramset/Redhead. Install bolts in accordance with the approved manufacturer's written requirements. Provide minimum 1/2 in. diameter bolts with 3-1/4 in. embedment unless otherwise indicated.

M. Adhesive Anchor Rod System: Adhesive anchor rod system shall be Hilti HY150 or equal by W.R. Meadows or Five Star, utilizing ASTM F 593 AISI 304 threaded stainless-steel rods or Engineer approved substitute. Preparation, drilling, and installation shall be in accordance with the approved manufacturer's written requirements. Install rods as recommended by the manufacturer. Unless otherwise indicated, provide adhesive anchor rod system for fastening support steel to fully grouted concrete masonry, and concrete or precast concrete walls/panels and floors.

2.02 FABRICATION

A. General Fabrication: Fabricate Work to be straight and true, plumb, level and square and to sizes, shapes, and profiles indicated on approved shop drawings. Ease exposed edges. Cut, reinforce, drill and tap metalwork as necessary for proper assembly and use.

1. Fabricate all miscellaneous metal supports, brackets, braces and the like required to fully complete the Work of this project.
2. Coordinate miscellaneous metal requirements with other specification Sections to ensure proper interface of various parts of the Work.
3. Obtain loading requirements from suppliers of Work to be supported and design and fabricate support systems with factor of safety of at least 6.

B. Work Exposed to View: Take special care in choosing materials that are smooth and free of blemishes such as pits, roller marks, trade names, scale, and roughness. Fabricate Work with uniform, hairline tight joints. Form welded joints and seams continuously and grind flush and smooth to be invisible after painting. For exposed fasteners, use hex head bolts or Phillips head machine screws.

C. All steel to be installed in or on exterior portions of building, or otherwise attached thereto, including but not limited to, steel framing members at exterior soffits, lintels, shelf angles, stabilization angles, ladders, and bolts, washers, and other hardware, shall be coated by hot-dip process after fabrication in accordance with requirements of ASTM A 123 for fabricated components, and ASTM A 153 for hardware. All hot-dipped galvanized fabricated steel components and hardware shall be inspected and marked with a stamp indicating compliance with the respective ASTM standard for the number of ounces of zinc per square foot of steel, in accordance with requirements of the referenced standards. Zinc for galvanizing shall be applied by the hot-dip process, Duragalv® by Duncan Galvanizing, or equal by M.C. Steel or Korns Galvanizing, Inc. The galvanizing bath shall contain high-grade zinc, nickel, and other earthly materials. Galvanizing shall exhibit a rugosity (smoothness) not greater than 4 rug (16-20 microns of variation) when measured by a profilometer over a 1 in. straight line on the surface of architectural and structural elements that are less than 24 pounds per running foot. The Profilometer shall be capable of operating in 1-micron increments.

1. Galvanizing shall be performed by a company with a minimum of five years' experience in the successful application of hot-dip galvanizing utilizing the dry kettle process. Use of the wet kettle process shall not be allowed. The Architect shall have the right to inspect and approve or reject the galvanizer/galvanizing facility.
2. The galvanizer/galvanizing facility must have an ongoing Quality Control/Quality Assurance program acceptable to the Architect which has been in effect for a minimum of five years and shall provide the Architect with process and final inspection documentation.

3. Touch-up damaged galvanizing after installation using organic zinc coating complying with ASTM A 780 and as recommended by galvanizer.
4. The fabricator shall provide a notarized statement from the galvanizer, along with a description of the material processed, indicating that all work has been done in conformance with this specification prior to receiving payment.
5. All items of Work noted or specified to be galvanized shall be galvanized after fabrication. Where the size of assembly is too large for galvanizing, only these assemblies shall be galvanized prior to fabrication. Submit galvanizer's certification that shop drawings for metal fabrications to receive metal coatings have been reviewed and that fabrications are acceptable to galvanizer for proper application of galvanizing and metal coatings. All drawings should be stamped by the galvanizer to indicate approval of design for galvanizing.
6. Provide factory-applied prime coat, Primergalv, by Duncan Galvanizing, or equal by Court Galvanizing, Inc. Prime coat shall be certified VOC compliant, conforming to applicable regulations and EPA standards. Apply primer within 12 hours after galvanizing at the same facility where the galvanizing is done in a controlled environment meeting applicable environmental regulations and as recommended by the primer coating manufacturer. Blast cleaning of the surface is unacceptable for surface preparation by means of blast cleaning shall not be allowed. Coatings shall meet or exceed the criteria for the following categories as stipulated by the coatings manufacturer:
    a. Abrasion: CS17 Wheel, 1,000 grams load, in accordance with ASTM D 4060
    b. Adhesion: 5 mm Crosshatch, in accordance with ASTM D 3359, Method B
    c. Humidity: ASTM D 4585
    d. Salt Spray (Fog): ASTM B 117
7. Painting and Preparation of Non-Galvanized Steel Products:
    a. Thoroughly clean all steel of all loose mill scale by power wire-brushing or sand blasting. Remove all rust, dirt weld flux, weld splatter and other foreign matter by wire brushing or scraping (power wire brushing if necessary). Grind smooth any sharp projections. Oil and grease deposits shall be removed by solvent.
    b. All steel members, except galvanized items, after they are prepared, shall be painted before shipping. All surfaces shall be painted, except machine surfaces, surfaces which are to be welded and surfaces to be encased in concrete. Paint shall be applied thoroughly and evenly on the surfaces and Worked into the joints and other open surfaces. Surfaces inaccessible after assembly shall be given two coats. Painting materials shall be as follows:
        1) Cleaned steel shall receive one coat of shop applied, two-component, moisture-cured, urethane based, zinc-rich organic coating applied at rate of 3.0 – 3.5 mil DFT, as manufactured by Benjamin-Moore, or equal by Tnemec or Axalta.

2.03 LINTELS

A. Fabricate lintels for openings and recesses in walls and partitions shown in the drawings and elsewhere as needed. Provide at least 8 in. bearing at each end, unless otherwise detailed. Weld together individual members of composite lintels made up of more than one member. Lintel type and sizes shall be as follows:

LINTEL SCHEDULE				
Masonry Opening	**Lintel Type**	**Angle**	**Plate**	**Weld**
Up to 3 ft.	Standard	3-1/2 x 3-1/2 x 5/16 in.		
Up to 4 ft. – 6 in.	Standard	L 4 x 3-1/2 x 5/16 in. (4 in. leg vertical)		
Up to 5 ft. – 4 in.	Standard	L 4 x 3-1/2 x 5/16 in. (4 in. leg vertical)		
Up to 6 ft.	Standard	L 5 x 3-1/2 x 5/16 in. (5 in. leg vertical)		
Up to 8 ft.	Standard	L 6 x 3-1/2 x 5/16 in. (6 in. leg vertical)		
Up to 10 ft.	Standard	L 6x4x5/16 in. (6 in. leg vertical)		
Up to 4 ft. – 6 in.	Composite	L 4x3x1/4 in. (4 in. leg vertical)	5/16 in.	1/4 in. Fillet
Up to 5 ft. – 4 in.	Composite	L 5x3x1/4 in. (5 in. leg vertical)	5/16 in.	1/4 in. Fillet
Up to 6 ft.	Composite	L 5x3x1/4 in. (5 in. leg vertical)	5/16 in.	1/4 in. Fillet
Up to 8 ft.	Composite	L 6x3x1/4 in. (6 in. leg vertical)	5/16 in.	1/4 in. Fillet
Up to 10 ft.	Composite	C 7x9.8 (7 in. vertical)	5/16 in.	1/4 in. Fillet
Up to 12 ft.	Composite	C 7x9.8 (7 in. vertical)	5/16 in.	1/4 in. Fillet
Up to 14 ft.	Composite	C 7x9.8 (7 in. vertical)	5/16 in.	1/4 in. Fillet

2.04 BEARING AND LEVELING PLATES

A. Design and fabricate plates for steel and wood members bearing on masonry or concrete that are not indicated or required on structural drawings. Provide flat, uniform bearing areas of size and thickness required for loading conditions encountered. Use standard AISC and AITC design criteria. Drill plates as necessary to receive anchor bolts and for grouting access.

2.05 CLIP ANGLES ATTACHED TO CMU WALLS

A. All clip angles attached to CMU walls shall be furnished and installed under the Work of this Section, with sizes as indicated on the structural drawings. If required angles are not indicated on structural drawings provide 12-gauge, 4 in. x 6 in. x 8 in. long steel angles at top of masonry partitions, 4 feet on center staggered, to resist lateral movement. The Metal Fabrication Subcontractor shall provide details of the various conditions needed to meet project requirements.

2.06 ROUGH HARDWARE

A. Provide standard and custom fabricated bolts, anchors, hangers, dowels, and other miscellaneous metal items as needed to properly complete the Work of the project.

PART 3 - EXECUTION

3.01 INSTALLATION / ERECTION

A. Provide suitable anchors and fasteners to connect miscellaneous metal items to other construction. Provide setting templates and diagrams and coordinate with other Work so that adequate anchor bolts, blocking and bracing are in place and accurately located. Beginning Work means Installer accepts substrates and conditions.

B. Set Work accurately and plumb, level and aligned. Make field assembly and connections with the same level of quality as shop fabricated Work.

C. For bearing and leveling plates, clean concrete and masonry bearing surfaces and roughen to improve bond. Thoroughly clean steel bearing surfaces. Set loose plates on shims or wedges. Level and plumb Work, then tighten anchor bolts. Cut off protruding shims and wedges and pack voids solidly with grout.

D. Install elevator sill support angle at locations and position directed by elevator supplier. Securely anchor to supporting structure in compliance with approved shop drawings.

3.02 TOLERANCES

A. The following allowable installed tolerances are allowable variations from locations and dimensions indicated by the Contract Document and shall not be added to allowable tolerances indicated for other Work.

1. Allowable Variation from True Plumb: ± 1/8 in. in 20 ft.
2. Allowable Variation from True Level: ± 1/8 in. in 20 ft.
3. Allowable Variation from True Line: ± 1/8 in. in 20 ft.

3.03 REPAIRING, CLEANING, AND PROTECTION

A. Repair minor damage to all Work of this Section, including coatings and finishes, to eliminate all evidence of repair. Remove and replace Work which cannot be satisfactorily repaired, as determined by the Architect.

3.04 RUBBISH REMOVAL

A. The Subcontractor of this Section shall stockpile and drop daily of all wastes and debris at areas designated by the General Contractor.

B. The General Contractor shall remove and dispose daily all waste and debris in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION

SECTION 05 51 00

METAL STAIRS
(Part of the Work of Section 05 50 00 – Metal Fabrications, Filed Sub-Bid Required)

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01- General Requirements, apply to the Work of this Section.

1.02 FILED SUB-BID REQUIREMENTS

A. The Work of this Section shall be included as Part of the Work of Section 05 50 00 – Metal Fabrications, stipulated as a Filed Sub-Bid under Paragraph D, Item 2 of the Form for General Bid.

B. The Sub-Bidder of Section 05 50 00 – Metal Fabrications shall examine all Drawings and all Sections for requirements affecting the Work of this Section as shown primarily in the following drawings:

1. Lincoln Elementary School: A1.01 through A12.01.
2. Thorndyke Road Elementary School: A1.01 and A1.02.

C. The Sub-Bidder of Section 05 50 00 – Metal Fabrications shall examine other drawings and specification sections that could affect the Work of this Section as it relates to coordination. The other drawings are the following:

1. Lincoln Elementary School: D1.01 through D7.01; S0.01 through S1.02; FP1.01 through FP1.03; DP1.01 and P1.01; ED.1 through FA.2; DH1.01 and H1.01; VT.01.
2. Thorndyke Road Elementary School: D1.01 through D7.01; S0.01 through S2.01; FP1.01 through FP1.03; DP1.01 through P1.02; ED.0 through FA.3; H1.01 and H1.03; VT.02.

1.03 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:

1. Steel pan stairs
2. Steel pan landings
3. Steel channels, beams, tubing, posts, bearing plates, leveling plates, and rough hardware required to complete the Work of this Section.

1.04 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
2. Section 02 41 13 - Selective Demolition
3. Section 03 54 13 - Cementitious Underlayment
4. Section 04 20 00 – Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.05 QUALITY ASSURANCE

A. Reference Standards:
   1. ASTM A36: Specification for Structural Steel.
   2. ASTM A569: Specification for Steel, Carbon (0.15 maximum percent), Hot-rolled Sheet and Strip, Commercial Quality.
   3. ASTM A123: Specification for Zinc (hot - galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged steel shapes, Plates, Bars and Strip.
   4. ASTM A143: Practice for Safeguarding against Embrittlement of Hot-Dip Galvanized Structural Steel Products and the Procedure for Detecting Embrittlement.

B. Provide the services of a Professional Engineer, registered in the State of Massachusetts to design and certify that the Work of this Section meets or exceeds the performance requirements specified in this Section. Engineer shall be experienced in providing engineering services of the kind indicated that have resulted in the successful installation of metal fabrications similar in material, design, and extent to that indicated for this project.

C. Shop fabricates work to the greatest extent possible. Clearly label pieces in shop to facilitate field assembly.

D. Perform welding in compliance with American Welding Society Code.

E. Certifications:
   1. Submit certification that the shop painting has been done in accordance with specifications.
   2. Submit certificate of compliance from galvanizer.

1.06 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures, Section and in accordance with requirements of the Contract Documents.

B. Submit manufacturer's product data, installation instructions, use limitations, and recommendations for each material used. Provide certifications stating that materials comply with requirements.

C. Submit large scale shop drawings for fabrication, installation, and erection of all parts of the Work. Provide plans, elevations, and details of anchorages, connections, and accessory items.

D. Take accurate field measurements before preparing shop drawings and fabrication. Allow for field cutting and fitting where taking field measurements before fabrication is not possible. Do not field cut or fit items which have been hot dip galvanized after fabrication.

E. Submit professionally prepared calculations and certification of the performance of this Work. Show how design load requirements and other performance criteria have been satisfied. Calculations shall be stamped and signed by a professional Engineer registered in the Commonwealth of Massachusetts.

1.07 DELIVERY, STORAGE AND HANDLING

A. All materials shall be carefully handled and stacked to prevent deformation or damage. All miscellaneous steel members shall be carefully stored on substantial timbers and blocking, so arranged that the steel shall be free from the earth and properly drained, preventing any spattering or accumulation of water in or about the steel. Care shall be taken to prevent damage to the shop coat of paint and prevent the accumulation of mud dirt or other foreign matter on the steel. Such accumulation shall be completely removed prior to erection.

1.08 PROJECT CONDITIONS

A. Do not permit use of stairs and related components, including handrails and guardrails, until Work is completely and fully installed and ready to assume its intended design loads. Do not permit overloading of any metal stair component or system.

1.09 SOURCE QUALITY CONTROL

A. The registered engineer shall make periodic visits to the site to inspect and test as necessary the stairs, and related metal work assemblies, including handrails and guardrails. After completion of the Work and based on these inspections, an affidavit stamped with the seal of the engineer is to be issued. The affidavit shall state that the Work has been installed in accordance with his/her design.

1.10 CUTTING AND CORING

A. The installation of new Work that requires cutting and coring of floors, walls, and roofs with dimensions 5-1/2 in. or less shall be performed by the Subcontractor of this Section. The General Contractor shall cut and core floors, walls, and roofs with dimensions not indicated by the Subcontractor of this Section.

1.11 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner's Project Manager, Architect, and related subcontractors.

PART 2 - PRODUCTS

2.01 MATERIALS AND PRODUCTS

A. Steel Shapes: Steel shapes shall conform to the requirements of Standard Specifications for Structural Steel, ASTM A - 36. All necessary holes and sinkage's shall be provided for attaching hardware or other items, and all anchorage for attachment to adjacent construction shall be included.

B. Steel Tubing: ASTM A500 or A501, hot or cold rolled.

C. Steel Sheet: ASTM A366, A570 or A611, of grade required for design loading.

D. Steel Pipe: ASTM A53, black schedule 40 or 80 for 3 in. diameter pipe and under and schedule 80 for all pipe over 3 inches in diameter. Provide type and grade necessary to comply with specified design loading.

E. Iron Castings: ASTM A47 or A48, grade and class are manufacturer's option.

F. Grout: Pre-mixed, non-staining, non-corrosive, non-shrink, non-metallic cement-based grout requiring only the addition of water. Grout shall exhibit shrinkage compensation characteristics in both the plastic and hardened states, and conform with ASTM C1107, "Grade C", CRD-C621-91, *Standard Specification for Packaged Dry Hydraulic Grout – Non-Shrink*. One of the following grouts, or Engineer approved substitute, may be used:

1. "Five Star Grout 100 by Five Star Products Inc."
2. "SikaGrout 212 as manufactured by Sika Corporation."
3. "Masterflow 928 by Master Builders, Inc.

G. Bolts and Fasteners: ASTM A307 and other types as appropriate and approved by Architect.

H. Concrete: Concrete shall be provided by Section 03 30 00 – Cast-in-Place Concrete.

I. Shop Paint: Shop paint shall be Modified Alkyd primer equal to Tnemec No. 10-99G Green Metal Primer, Dupont 681 FD Primer, or Hempel Primer 1205.

J. Field Painting: Surface preparation and field painting shall be as specified in Section 09 91 13 – Painting.

K. Expansion Fastening Systems: Expansion bolts shall be HILTI KWIK bolts or approved equal by Powers Fastening, Inc. or ITW Ramset/Redhead. Install bolts in accordance with the approved manufacturer's written requirements. Provide minimum 1/2 in. diameter bolts with 3-1/4 in. embedment unless otherwise indicated.

L. Adhesive Anchor Rod System: Adhesive anchor rod system shall be Hilti HY150, or equal by W.R. Meadows or Five Star, utilizing ASTM F 593 AISI 304 threaded stainless-steel rods or Engineer approved substitute. Preparation, drilling, and installation shall be in accordance with the approved manufacturer's written requirements. Unless otherwise indicated, provide adhesive anchor rod system for fastening support steel to fully grouted concrete masonry, and concrete or precast concrete walls/panels and floors.

2.02 FABRICATION

A. General Fabrication: Fabricate Work to be straight and true, plumb, level, and square and to sizes, shapes, and profiles indicated on approved shop drawings. Ease exposed edges. Cut, reinforce, drill, and tap metalwork as necessary for proper assembly and use.

1. Fabricate all miscellaneous metal supports, brackets, braces, and the like required to fully complete the Work of this project.
2. Coordinate miscellaneous metal requirements with other specification Sections to ensure proper interface of various parts of the Work.
3. Obtain loading requirements from suppliers of Work to be supported and design and fabricate support systems with factor of safety of at least 6.

B. Work Exposed to View: Take special care in choosing materials that are smooth and free of blemishes such as pits, roller marks, trade names, scale, and roughness. Fabricate Work with uniform, hairline tight joints. Form welded joints and seams continuously and grind flush and smooth to be invisible after painting. For exposed fasteners, use hex head bolts or Phillips head machine screws.

C. All steel to be installed in or on exterior portions of building, or otherwise attached thereto, including but not limited to, steel framing members at exterior soffits, lintels, shelf angles, stabilization angles, ladders, and bolts, washers, and other hardware, shall be coated by hot-dip process after fabrication in accordance with requirements of ASTM A 123 for fabricated components, and ASTM A 153 for hardware. All hot-dipped galvanized fabricated steel components and hardware shall be inspected and marked with a stamp indicating compliance with the respective ASTM standard for the number of ounces of zinc per square foot of steel, in accordance with requirements of the referenced standards. Zinc for galvanizing shall be applied by the hot-dip process, Duragalv® by Duncan Galvanizing or equal by M.C. Steel or Korns Galvanizing, Inc. The galvanizing bath shall contain high-grade zinc, nickel, and other earthly materials. Galvanizing shall exhibit a rugosity (smoothness) not greater than 4 rug (16-20 microns of variation) when measured by a profilometer over a 1 in. straight line on the surface of architectural and structural elements that are less than 24 pounds per running foot. The Profilometer shall be capable of operating in 1-micron increments.

1. Galvanizing shall be performed by a company with a minimum of five years' experience in the successful application of hot-dip galvanizing utilizing the dry kettle process. Use of the wet kettle process shall not be allowed. The Architect shall have the right to inspect and approve or reject the galvanizer/galvanizing facility.
2. The galvanizer/galvanizing facility must have an ongoing Quality Control/Quality Assurance program acceptable to the Architect which has been in effect for a minimum of five years and shall provide the Architect with process and final inspection documentation.
3. Touch-up damaged galvanizing after installation using organic zinc coating complying with ASTM A 780 and as recommended by galvanizer.

4. The fabricator shall provide a notarized statement from the galvanizer, along with a description of the material processed, indicating that all work has been done in conformance with this specification prior to receiving payment.
5. All items of Work noted or specified to be galvanized shall be galvanized after fabrication. Where size of assembly is too large for galvanizing, only these assemblies shall be galvanized prior to fabrication. Submit galvanizer's certification that shop drawings for metal fabrications to receive metal coatings have been reviewed and that fabrications are acceptable to galvanizer for proper application of galvanizing and metal coatings. All drawings should be stamped by the galvanizer to indicate approval of design for galvanizing.
6. Provide factory-applied prime coat, Primergalv, by Duncan Galvanizing, or equal by Court Galvanizing, Inc. Prime coat shall be certified VOC compliant, conforming to applicable regulations and EPA standards. Apply primer within 12 hours after galvanizing at the same facility where the galvanizing is done in a controlled environment meeting applicable environmental regulations and as recommended by the primer coating manufacturer. Blast cleaning of the surface is unacceptable for surface preparation by means of blast cleaning shall not be allowed. Coatings shall meet or exceed the criteria for the following categories as stipulated by the coatings manufacturer:
    a. Abrasion: CS17 Wheel, 1,000 grams load, in accordance with ASTM D 4060
    b. Adhesion: 5 mm Crosshatch, in accordance with ASTM D 3359, Method B
    c. Humidity: ASTM D 4585
    d. Salt Spray (Fog): ASTM B 117

D. Painting and Preparation of Non-Galvanized Steel Products:

1. Thoroughly clean all steel of all loose mill scale by power wire-brushing or sand blasting. Remove all rust, dirt weld flux, weld splatter and other foreign matter by wire brushing or scraping (power wire brushing if necessary). Grind smooth any sharp projections. Oil and grease deposits shall be removed by solvent.
2. All steel members, except galvanized items, after they are prepared, shall be painted before shipping. All surfaces shall be painted, except machine surfaces, surfaces which are to be welded and surfaces to be encased in concrete. Paint shall be applied thoroughly and evenly on the surfaces and Worked into the joints and other open surfaces. Surfaces inaccessible after assembly shall be given two coats. Painting materials shall be as follows:
    a. Cleaned steel shall receive one coat of shop applied, two-component, moisture-cured, urethane based, zinc-rich organic coating applied at rate of 3.0 - 3.5 mil DFT, as manufactured by Benjamin-Moore or equal by Tnemec or Axalta.

2.03 STAIRS AND LANDINGS

A. Design and fabricate stair and landing systems with dimensions, spacing, details and anchorages necessary to conform to size and configurations indicated on the Drawings, and comply with requirements of 780 CMR and all other applicable codes and ordinances related to fire exit stairs.

B. Design stair and landing system to support a design live load of 100 lbs./sq. ft., or a concentrated load of 300 pounds at a location to cause greatest stress, whichever is greater. Design anchors, connections, support brackets and all other interfaces with the supporting structure.

C. Take field measurements to accurately determine actual floor-to-floor heights and fabricate stairs so that there shall not be variation exceeding 3/16 in. in the depth of adjacent treads or in the height of adjacent risers. The tolerance between the largest and smallest riser or between the largest and smallest tread shall not exceed 3/8 inch in any flight of stairs.

D. Fabricate stringers from steel channels or plates. Form metal tread and landing pans from 12 gage minimum steel sheet with ribs, to the shape shown on approved shop drawings. Weld tread and landing pans to supporting frames.

1. Shop weld and assemble stair systems to the greatest extent possible. Locate bolted connections in inconspicuous areas.
2. Design and fabricate all elements of stairs to provide a maximum deflection of L/360 LL and L/240 TL

2.04 BEARING AND LEVELING PLATES

A. Design and fabricate plates for steel and wood members bearing on masonry or concrete that are not indicated or required on structural drawings. Provide flat, uniform bearing areas of size and thickness required for loading conditions encountered. Use standard AISC and AITC design criteria. Drill plates as necessary to receive anchor bolts and for grouting access.

2.05 ROUGH HARDWARE

A. Provide standard and custom fabricated bolts, anchors, hangers, dowels and other miscellaneous metal items as needed to properly complete the Work of this Section.

PART 3 - EXECUTION

3.01 INSTALLATION/ERECTION

A. Provide suitable anchors and fasteners to connect Work of this Section to other construction. Provide setting templates and diagrams and coordinate with other Work so that adequate anchor bolts, blocking and bracing are in place and accurately located. Beginning Work means Installer accepts substrates and conditions.

B. Set Work accurately and plumb, level and aligned. Make field assembly and connections with the same level of quality as shop fabricated Work.

C. For bearing and leveling plates, clean concrete and masonry bearing surfaces and roughen to improve bond. Thoroughly clean steel bearing surfaces. Set loose plates on shims or wedges. Level and plumb Work, then tighten anchor bolts. Cut off protruding shims and wedges and pack voids solidly with grout.

3.02 TOLERANCES

A. The following allowable installed tolerances are allowable variations from locations and dimensions indicated by the Contract Document and shall not be added to allowable tolerances indicated for other Work.

1. Allowable Variation from True Plumb: ± 1/8 inch in 20'-0"
2. Allowable Variation from True Level: ± 1/8 inch in 20'-0"
3. Allowable Variation from True Line: ± 1/8 inch in 20'-0"

3.03 REPAIRING, CLEANING, AND PROTECTION

A. Repair minor damage to all stair components, and coating or finishes, to eliminate all evidence of repair. Remove and replace Work which cannot be satisfactorily repaired, as determined by the Architect.

3.04 RUBBISH REMOVAL

A. The Subcontractor of this Section shall stockpile and drop daily all wastes and debris at areas designated by the General Contractor.

B. The General Contractor shall remove and dispose daily all waste and debris in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION

SECTION 05 52 13

PIPE AND TUBE RAILINGS

(Part of the Work of Section 05 50 00 – Metal Fabrications, Filed Sub-Bid Required)

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01- General Requirements, apply to the Work of this Section.

1.02 FILED SUB-BID REQUIREMENTS

A. The Work of this Section shall be included as Part of the Work of Section 05 50 00 – Metal Fabrications, stipulated as a Filed Sub-Bid under Paragraph D, Item 2 of the Form for General Bid.

B. The Sub-Bidder of Section 05 50 00 – Metal Fabrications shall examine all Drawings and all Sections for requirements affecting the Work of this Section as shown primarily in the following drawings:

1. Lincoln Elementary School: A1.01 through A12.01.
2. Thorndyke Road Elementary School: A1.01 and A1.02.

C. The Sub-Bidder of Section 05 50 00 – Metal Fabrications shall examine other drawings and specification sections that could affect the Work of this Section as it relates to coordination. The other drawings are the following:

1. Lincoln Elementary School: D1.01 through D7.01; S0.01 through S1.02; FP1.01 through FP1.03; DP1.01 and P1.01; ED.1 through FA.2; DH1.01 and H1.01; VT.01.
2. Thorndyke Road Elementary School: D1.01 through D7.01; S0.01 through S2.01; FP1.01 through FP1.03; DP1.01 through P1.02; ED.0 through FA.3; H1.01 and H1.03; VT.02.

1.03 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:

1. Steel handrails
2. Rough hardware required to complete the Work of this Section.
3. Hot dipped galvanizing and shop priming of exterior handrails.

1.04 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.

2. Section 02 41 13 - Selective Demolition
3. Section 03 54 13 - Cementitious Underlayment
4. Section 04 20 00 – Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.05 QUALITY ASSURANCE

A. Reference Standards:
   1. ASTM A36: Specification for Structural Steel.
   2. ASTM A569: Specification for Steel, Carbon (0.15 maximum percent), Hot-rolled Sheet and Strip, Commercial Quality.
   3. ASTM A123: Specification for Zinc (hot - galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged steel shapes, Plates, Bars and Strip.
   4. ASTM A143: Practice for Safeguarding against Embrittlement of Hot-Dip Galvanized Structural Steel Products and the Procedure for Detecting Embrittlement.
   5. ASTM A 554 - Standard Specification for Welded Stainless Steel Mechanical Tubing.
   6. ASTM A 492 - Standard Specification for Stainless Steel Rope Wire.

B. Provide the services of a Professional Engineer, registered in the State of Massachusetts to design and certify that the Work of this Section meets or exceeds the performance requirements specified in this Section. Engineer shall be experienced in providing engineering services of the kind indicated that have resulted in the successful installation of metal fabrications similar in material, design, and extent to that indicated for this project.
   1. Items requiring an engineer's certification include, but are not limited to, the following:
      a. Handrails and guardrails

C. Shop fabricates work to the greatest extent possible. Clearly label pieces in shop to facilitate field assembly.

D. Perform welding in compliance with American Welding Society Code.

E. Certifications:
   1. Submit certification that the shop painting has been done in accordance with specifications.

2. Submit certificate of compliance from galvanizer.

1.06 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures and in accordance with requirements of the Contract Documents.

B. Submit manufacturer's product data, installation instructions, use limitations, and recommendations for each material used. Provide certifications stating that materials comply with requirements.

C. Submit product test reports from a qualified independent 3rd party testing agency indicating each type and class of panel system complies with the project performance requirements, based on comprehensive testing of specified products. Test reports required are:

1. Rate of Burning (ASTM D 635)
2. Self-Ignition Temperature (ASTM D 1929)
3. Density of Smoke (ASTM D 2843)
4. Flame spread and Smoke developed testing (ASTM E 84)
5. Room Corner Burn Test (NFPA 286)
6. Extent of Burning (UL 94)
7. Impact strength (ASTM D 3763)
8. Safety glazing impact resistance (ANSI Z97.1-2004)
9. UPITT Test for Combustion Product Toxicity
10. Dynamic environmental testing (ASTM standards D 5116 and D 6670)

D. Submit large scale shop drawings for fabrication, installation, and erection of all parts of the Work. Provide plans, elevations, and details of anchorages, connections, and accessory items.

E. Take accurate field measurements before preparing shop drawings and fabrication. Allow for field cutting and fitting where taking field measurements before fabrication is not possible. Do not field cut or fit items which have been hot dip galvanized after fabrication.

F. Submit professionally prepared calculations and certification of the performance of this Work. Show how design load requirements and other performance criteria have been satisfied. Calculations shall be stamped and signed by a professional Engineer registered in the Commonwealth of Massachusetts.

1.07 DELIVERY, STORAGE AND HANDLING

A. All materials shall be carefully handled and stacked to prevent deformation or damage. All miscellaneous steel members shall be carefully stored on substantial timbers and blocking, so arranged that the steel shall be free from the earth and properly drained, preventing any spattering or accumulation of water in or about the steel. Care shall be taken to prevent damage to the shop coat of paint and prevent the accumulation of mud dirt or other foreign matter on the steel. Such accumulation shall be completely removed prior to erection.

1.08 PROJECT CONDITIONS

A. Do not permit overloading or use of the Work of this Section until all Work is completely and fully installed and ready to assume its intended design loads.

1.09 SOURCE QUALITY CONTROL

A. The registered engineer shall make periodic visits to the site to inspect and test as necessary the stairs, handrail, and other metal Work assemblies. After completion of the Work and based on these inspections, an affidavit stamped with the seal of the engineer is to be issued. The affidavit shall state that the Work has been installed in accordance with his/her design.

1.10 CUTTING AND CORING

A. The installation of new Work that requires cutting and coring of floors, walls, and roofs with dimensions 5-1/2 in. or less shall be performed by the Subcontractor of this Section. The General Contractor shall cut and core floors, walls, and roofs with dimensions not indicated by the Subcontractor of this Section.

1.11 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner's Project Manager, Architect, and related subcontractors.

PART 2 - PRODUCTS

2.01 MATERIALS AND PRODUCTS

A. Steel Shapes: Steel shapes shall conform to the requirements of Standard Specifications for Structural Steel, ASTM A - 36. All necessary holes and sinkage's shall be provided for attaching hardware or other items, and all anchorage for attachment to adjacent construction shall be included.

B. Steel Tubing: ASTM A500 or A501, hot or cold rolled.

C. Steel Sheet: ASTM A366, A570 or A611, of grade required for design loading.

D. Steel Pipe: ASTM A53, black schedule 40 or 80 for 3 in. diameter pipe and under and schedule 80 for all pipe over 3 in. in diameter. Provide type and grade necessary to comply with specified design loading.

E. Iron Castings: ASTM A47 or A48, grade and class are manufacturer's option.

F. Grout: Pre-mixed, non-staining, non-corrosive, non-shrink, non-metallic cement-based grout requiring only the addition of water. Grout shall exhibit shrinkage compensation characteristics in both the plastic and hardened states, and conform with ASTM C1107, "Grade C", CRD-C621-91, *Standard Specification for Packaged Dry Hydraulic Grout - Non-Shrink*. One of the following grouts, or Engineer approved substitute, may be used:

1. "Five Star Grout 100 by Five Star Products Inc."
2. "SikaGrout 212 as manufactured by Sika Corporation."
3. "Masterflow 928 by Master Builders, Inc.

G. Bolts and Fasteners: ASTM A307 and other types as appropriate and approved by Architect.

H. Concrete: Concrete to be provided by Section 03 30 00 – Cast-in-Place Concrete.

I. Shop Paint: Shop paint shall be Modified Alkyd primer equal to Tnemec No. 10-99G Green Metal Primer, Dupont 681 FD Primer, or Hempel Primer 1205.

J. Field Painting: Surface preparation and field painting shall be as specified in Section 09 91 13 - Painting

K. Aluminum: Provide alloy and temper recommended by aluminum producer or finisher for the type of use and finish indicated:

1. Extruded bar and shapes: ASTM B 221, 6061-T6, 6063-T6.
2. Extruded pipe and tube: ASTM B 429, 6063-T6.
3. Drawn Seamless tube: ASTM B 483, 6063-T832.
4. Plate and sheet: ASTM B209, 3003-H14.

L. Expansion Fastening Systems: Expansion bolts shall be HILTI KWIK bolts, or equal by Powers Fastening, Inc. or ITW Ramset/Redhead. Install bolts in accordance with the approved manufacturer's written requirements. Provide minimum 1/2 in. diameter bolts with 3-1/4 in. embedment unless otherwise indicated.

M. Adhesive Anchor Rod System: Adhesive anchor rod system shall be Hilti HY150, or equal by W.R. Meadows or Five Star, utilizing ASTM F 593 AISI 304 threaded stainless-steel rods or Engineer approved substitute. Preparation, drilling, and installation shall be in accordance with the approved manufacturer's written requirements. Install rods as recommended by the manufacturer. Unless otherwise indicated, provide adhesive anchor rod system for fastening support steel to fully grouted concrete masonry, and concrete or precast concrete walls/panels and floors.

2.02 FABRICATION

A. General Fabrication: Fabricate Work to be straight and true, plumb, level, and square and to sizes, shapes, and profiles indicated on approved shop drawings. Ease exposed edges. Cut, reinforce, drill, and tap metalwork as necessary for proper assembly and use.

1. Fabricate all miscellaneous metal supports, brackets, braces, and the like required to fully complete the Work of this project.
2. Coordinate miscellaneous metal requirements with other specification Sections to ensure proper interface of various parts of the Work.
3. Obtain loading requirements from suppliers of Work to be supported and design and fabricate support systems with factor of safety of at least 6.

B. Work Exposed to View: Take special care in choosing materials that are smooth and free of blemishes such as pits, roller marks, trade names, scale, and roughness. Fabricate Work with uniform, hairline tight joints. Form welded joints and seams continuously and grind flush and smooth to be invisible after painting. For exposed fasteners, use hex head bolts or Phillips head machine screws.

C. All steel to be installed in or on exterior portions of building, or otherwise attached thereto, including but not limited to, steel framing members at exterior soffits, lintels, shelf angles, stabilization angles, ladders, and bolts, washers, and other hardware, shall be coated by hot-dip process after fabrication in accordance with requirements of ASTM A 123 for fabricated components, and ASTM A 153 for hardware. All hot-dipped galvanized fabricated steel components and hardware shall be inspected and marked with a stamp indicating compliance with the respective ASTM standard for the number of ounces of zinc per square foot of steel, in accordance with requirements of the referenced standards. Zinc for galvanizing shall be applied by the hot-dip process, Duragalv® by Duncan Galvanizing, or equal. The galvanizing bath shall contain high-grade zinc, nickel, and other earthly materials. Galvanizing shall exhibit a rugosity (smoothness) not greater than 4 rug (16-20 microns of variation) when measured by a profilometer over a 1 in. straight line on the surface of architectural and structural elements that are less than 24 pounds per running foot. The Profilometer shall be capable of operating in 1-micron increments.

1. Galvanizing shall be performed by a company with a minimum of five years' experience in the successful application of hot-dip galvanizing utilizing the dry kettle process. Use of the wet kettle process shall not be allowed. The Architect shall have the right to inspect and approve or reject the galvanizer/galvanizing facility.
2. The galvanizer/galvanizing facility must have an ongoing Quality Control/Quality Assurance program acceptable to the Architect which has been in effect for a minimum of five years and shall provide the Architect with process and final inspection documentation.
3. Touch-up damaged galvanizing after installation using organic zinc coating complying with ASTM A 780 and as recommended by galvanizer.
4. The fabricator shall provide a notarized statement from the galvanizer, along with a description of the material processed, indicating that all work has been done in conformance with this specification prior to receiving payment.
5. All items of Work noted or specified to be galvanized shall be galvanized after fabrication. Where the size of assembly is too large for galvanizing, only these assemblies shall be galvanized prior to fabrication. Submit galvanizer's certification that shop drawings for metal fabrications to receive metal coatings have been reviewed and that fabrications are acceptable to galvanizer for proper application of galvanizing and metal coatings. All drawings should be stamped by the galvanizer to indicate approval of design for galvanizing.

2.03 HANDRAILS AND SUPPORT COMPONENTS

A. Fabricate all interior and exterior metal handrails, roof safety rails, railings and connections to design, dimensions and details indicated on the Drawings. Interior handrails shall be brushed stainless steel 304. Exterior railings shall be hot-dipped galvanized, ASA 40 sizes as indicated on the Drawings. Provide members in materials, sizes and profiles indicated, with support elements of size and spacings shown, but not less than required to withstand the following structural loads without exceeding the allowable design Working stress of the material involved, including anchors and connections. Apply each load to produce the maximum stress in each respective component of each metal fabrication.

1. Top rail of guardrail systems and roof safety rails shall withstand the following loads applied as indicated:

a. Concentrated load of 300 lbs. applied at any point non-concurrently, vertically downward, or horizontally.
b. Uniform load of 100 lbs. per lineal foot, applied vertically, non-concurrently with 100 lbs. per lineal foot horizontal uniform load.
c. Concentrated and uniform loads above need not be assumed to act concurrently.
d. Design and fabricate all elements of handrails, guardrails, and support components to provide a maximum deflection of L/240.

2. Handrails not serving as top rails shall withstand the following loads applied as indicated:
   a. Concentrated load of 200 lbs. applied at any point non-concurrently, vertically downward, or horizontally.
   b. Uniform load of 50 lbs. per lineal foot, applied non-concurrently, vertically downward, or horizontally.
   c. Concentrated and uniform loads above need not be assumed to act concurrently.
3. The infill area of guardrail systems shall withstand a horizontal concentrated load of 200 lbs. applied to one square foot at any point in the system including panels, intermediate rails, balusters, or other elements composing the infill area. Load need not be assumed to act concurrently with uniform horizontal loads on the top rails of the railing systems in determining stress on the guard.
4. Fabricate Work to be straight, plumb, level, and square.
5. Provide brackets, flanges, fittings, and anchors for the interconnection of handrail and railing components to other Work. Provide concealed fasteners for the interconnection of handrail and railing components, and for all other connections, except where exposed fasteners are unavoidable.
6. Perform welding to comply with AWS for recommended practices, using method appropriate for metal and finish indicated. Grind exposed welds flush and smooth to blend with adjoining finish metal surfaces.
7. Form bends by use of prefabricated elbow fittings and radius bends, as applicable.
8. Form simple and compound curves by bending members in jigs designed to produce uniform curvature with uniform profile of member throughout entire bend without buckling, twisting, or deforming in any way.
9. Steel support elements required for railing systems shall be fabricated using standard or custom bolts, anchors, hangers, dowels, and other miscellaneous metal items as needed to satisfy specified loading requirements. Provide malleable iron wall brackets railing brackets, Model 378, as manufactured by Julius Blum, or equal.

B. Rate of Burning (ASTM D 635). Material must attain a CC1 Rating for a nominal thickness of 0.060 in. and greater.

C. Self-Ignition Temperature (ASTM D 1929). Material must have a Self-ignition temperature greater than 650°F.

D. Density of Smoke (ASTM D 2843). Material must have a smoke density less than 75 percent.

E. Flame spread and Smoke developed testing (ASTM E 84). Material must be able to meet a level of Class A (Flame spread less than 25 and smoke less than 450) at thickness of 1 in.

F. Room Corner Burn Test (NFPA 286). Material must meet Class A criteria at 1/4 in. thickness as described by the 2003 International Building Code.

G. Extent of Burning (UL 94). Must submit UL card.

H. Impact strength. Minimum impact strength test as measured by ASTM D 3763 of 20 ft. lbs. (for durability, shipping, installation, and use).

I. Safety Glazing. Material must attain a Class A impact rating in accordance with ANSI Z97.1-2004 at 1/8 in. thickness.

J. UPITT Test for Combustion Product Toxicity: Product must be recorded as "not more toxic than wood".

K. Dynamic environmental testing (ASTM standards D 5116 and D 6670). Panels must not have detectable VOC off-gassing agents and must have Greenguard™ Indoor Air Quality certified.

L. Panels must be produced from a minimum of 40 percent post-industrial recycling content. This recycling content must be certified by a recognized 3rd party certification group, such as Scientific Certification Systems (SCS).

2.04 ROUGH HARDWARE

A. Provide standard and custom fabricated bolts, anchors, hangers, dowels, and other miscellaneous metal items as needed to properly complete the Work of the project.

PART 3 - EXECUTION

3.01 INSTALLATION/ERECTION

A. Provide suitable anchors and fasteners to connect the Work of this Section to other construction. Provide setting templates and diagrams and coordinate with other Work so that adequate anchor bolts, blocking and bracing are in place and accurately located. Beginning Work means Installer accepts substrates and conditions.

B. Set Work accurately and plumb, level and aligned. Make field assembly and connections with the same level of quality as shop fabricated Work.

C. Adjust handrails and guardrails prior to final anchoring and grouting. Plumb posts in both directions. Provide 1-1/2 in. clearance from inside of handrails to face of walls. Provide wall brackets at spacing shown, or if not shown, at no more than 6 ft. on center. Securely anchor wall brackets into structure or very secure blocking. Connections shall withstand loading specified for handrails and guardrails.

3.02 TOLERANCES

A. The following allowable installed tolerances are allowable variations from locations and dimensions indicated by the Contract Document and shall not be added to allowable tolerances indicated for other Work.

1. Allowable Variation from True Plumb: ± 1/8 in. in 20 ft.
2. Allowable Variation from True Level: ± 1/8 in. in 20 ft.
3. Allowable Variation from True Line: ± 1/8 in. in 20 ft.

3.03 REPAIRING, CLEANING, AND PROTECTION

A. Repair minor damage to all Work of this Section, including coatings and finishes, to eliminate all evidence of repair. Remove and replace Work which cannot be satisfactorily repaired, as determined by the Architect.

3.04 RUBBISH REMOVAL

A. The Subcontractor of this Section shall stockpile and drop daily of all wastes and debris at areas designated by the General Contractor.

B. The General Contractor shall remove and dispose daily all waste and debris in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION

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SECTION 05 55 16

METAL STAIR NOSING
(Part of the Work of Section 05 50 00 – Metal Fabrications, Filed Sub-Bid Required)

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01- General Requirements, apply to the Work of this Section.

1.02 FILED SUB-BID REQUIREMENTS

A. The Work of this Section shall be included as Part of the Work of Section 05 50 00 – Metal Fabrications, stipulated as a Filed Sub-Bid under Paragraph D, Item 2 of the Form for General Bid.

B. The Sub-Bidder of Section 05 50 00 – Metal Fabrications shall examine all Drawings and all Sections for requirements affecting the Work of this Section as shown primarily in the following drawings:

1. Lincoln Elementary School: A1.01 through A12.01.
2. Thorndyke Road Elementary School: A1.01 and A1.02.

C. The Sub-Bidder of Section 05 50 00 – Metal Fabrications shall examine other drawings and specification sections that could affect the Work of this Section as it relates to coordination. The other drawings are the following:

1. Lincoln Elementary School: D1.01 through D7.01; S0.01 through S1.02; FP1.01 through FP1.03; DP1.01 and P1.01; ED.1 through FA.2; DH1.01 and H1.01; VT.01.
2. Thorndyke Road Elementary School: D1.01 through D7.01; S0.01 through S2.01; FP1.01 through FP1.03; DP1.01 through P1.02; ED.0 through FA.3; H1.01 and H1.03; VT.02.

1.03 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:

1. Extruded stair nosing and kick plate.

1.04 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
2. Section 02 41 13 - Selective Demolition
3. Section 03 54 13 - Cementitious Underlayment

4. Section 04 20 00 – Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.05 REFERENCES

A. American Society for Testing and Materials (ASTM) Publications:
   1. ASTM B221 - Aluminum Alloy Extruded Bar, Rod, Wire, Shape, and Tube.

B. ICC/ANSI A117.1 - International Code Council/American National Standards Institute Standard on Accessible and Useable Buildings and Facilities.

C. Federal Test Method Standard - 501A – Standard for Fire Safety Criteria

1.06 SUBMITTALS

A. Provide in accordance with Section 01330 - Submittal Procedures:
   1. Product data for stair nosings.
   2. Installation and maintenance instructions.

1.07 QUALITY ASSURANCE

A. Stair nosing shall be provided and installed to comply with ICC/ANSI A117.1.

1.08 CUTTING AND CORING

A. The installation of new Work that requires cutting and coring of floors, walls, and roofs with dimensions 5-1/2 in. or less shall be performed by the Subcontractor of this Section. The General Contractor shall cut and core floors, walls, and roofs with dimensions not indicated by the Subcontractor of this Section.

1.09 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner's Project Manager, Architect, and related subcontractors.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Provide extruded aluminum 6063-T6 alloy, with abrasive epoxy filled ribs designed for renovating existing stairs; 3500 Series as manufactured by UPNOVR, Inc. or equal. The stair nosing shall comply with the following properties:
   1. Dimension: 4 in. wide x 5/16 in. thick
   2. Flange: 1-1/8 in.

B. Provide countersunk holes at existing stair tread for installation.

C. Provide aluminum kick plate to match profile at stair drawings.

2.02 ROUGH HARDWARE

A. Provide standard and custom fabricated bolts, anchors, hangers, dowels, and other miscellaneous metal items as needed to properly complete the Work of the project.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Prior to submitting shop drawings and fabrication, inspect existing stairs. Verify size and profile of tread, conditions, position of stair railing. Determine proposed renovation stair tread is compatible with existing conditions.

B. Install renovation stair tread on existing stairs according to manufacturer's instructions.

C. Center treads in width of stair with uniform space on both sides.

D. Provide expansion inserts and bolts of size and type recommended by stair tread manufacturer and as required for securely anchoring tread to existing stair.

E. Surface mount on existing stair tread. Install flush with concrete and tight to edge of riser. Ensure that installed treads are securely anchored, fasteners are tight and flush, and that exposed edges do not pose tripping hazard.

F. Protect the finish of nosing until completion of construction.

3.02 REPAIRING, CLEANING, AND PROTECTION

A. Repair minor damage to all Work of this Section, including coatings and finishes, to eliminate all evidence of repair. Remove and replace Work which cannot be satisfactorily repaired, as determined by the Architect.

3.03 RUBBISH REMOVAL

A. The Subcontractor of this Section shall stockpile and drop daily of all wastes and debris at areas designated by the General Contractor.

B. The General Contractor shall remove and dispose daily all waste and debris in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION

SECTION 06 10 00

ROUGH CARPENTRY

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, provision and installation of the following:

1. Concealed wood blocking within gypsum wallboard partitions, blocking to attach equipment at walls and ceilings, toilet room accessories, wood blocking for wall mounted shelving, plywood panels and similar items.
2. Plywood, wood furring, and wood blocking for all exterior and interior Work
3. Pressure treated wood framing members and plywood for all wood in contact with concrete or masonry.
4. Fire retardant treated wood framing members and plywood required by codes and ordinances.
5. Wood framing and blocking for platform.
6. Telephone and electrical equipment backing panels.
7. Wood preservative treatment for lumber and plywood cut in field.
8. Nails, screws, bolts, and fasteners for securing items of rough carpentry installed under the Work of this Section.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
2. Section 02 41 13 - Selective Demolition
3. Section 03 54 13 - Cementitious Underlayment
4. Section 04 20 00 – Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.

11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. 19. Section 31 20 00 – Earth Moving

1.04 PURPOSE

A. The Work of this Section shall be to provide concealed blocking, grounds, nailers, and backing panels, for the Work of this Project. Portions of Work related to this Section include, but are not limited to, toilet accessories, handrails and railings, and telephone and electrical equipment.

B. Coordinate the Work of this Section with the Work specified in Section 09 22 16 – Non-Structural Metal Framing and Gypsum Board. Determine which type of blocking, wood, or metal, is best suited to each situation and provide the appropriate type of blocking. Do not use wood blocking in fire-rated assemblies or other locations prohibited by authorities having jurisdiction.

1.05 QUALITY ASSURANCE

A. Lumber Grading Rules and Wood Species to be in conformance with Voluntary Product Standard PS-20; grading rules of the following associations apply to materials furnished under this Section.
   1. Northeast Lumber Manufacturer's Association, Inc.
   2. Western Wood Products Association.

B. Plywood Grading Rules:
   1. Softwood Plywood: Construction and Industrial: Product Standard PS-1.
   2. Hardwood Plywood: Product Standard PS-51.

C. Grade Marks: Identify all lumber and plywood by the official grade mark.
   1. Lumber: Grade stamp to contain symbol of grading agency, mill number or name, grade of lumber, species grouping or combination designation, rules under which graded, where applicable and condition of seasoning at time of surfacing.
   2. Softwood Plywood: Appropriate grade trademark of the American Plywood Association.
      a. Type, grade, class, and Identification Index.
      b. Inspection and testing agency mark.
   3. Hardwood Plywood: Appropriate grade trademark of the American Plywood Association or other qualified testing and grading agency.

D. Requirements of Regulatory Agencies:
   1. Working Stresses: Softwood lumber, National Design Specification; National Forest Products Association.
   2. Pressure Treated Lumber and Plywood: American Wood Preservers Association (AWPA) Standards.
   3. Pressure Treated Material: American Wood Preservers Association Standards.
   4. Fire Classification: Underwriters Laboratories, Inc. FRS for treated lumber and plywood.

1.06 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures and in accordance with requirements of the Contract Documents.

B. Submit manufacturer's product data, installation instructions, use limitations and recommendations for each material used. Provide certifications demonstrating materials comply with requirements of the Contract Documents.

C. Certifications:

1. Pressure Treated Wood: Submit certification by treating plant stating chemicals and process used, net number of salts retained, and conformance with applicable standards.
2. Pressure Treated Wood: Submit certification for water-borne preservative that moisture content was reduced to 19 percent maximum, after treatment.
3. Fire Retardant Treatment: Submit certification by the treating plant that the fire-retardant treatment materials comply with governing ordinances and that the treatment shall not bleed through finished surfaces.
4. Fire Treated Wood: Submit certification from the supplier of the fire-retardant treated lumber or plywood attesting that the wood is Dricon wood or satisfies the following:
    a. All pieces of lumber have been kiln-dried to a maximum moisture content of 19 percent or less after treatment. All plywood shall be dried to a moisture content of 15 percent after treatment.
    b. The fire-retardant chemicals used to treat the lumber were free of halogens, sulfates, ammonium phosphate and formaldehyde.
    c. The fire-retardant treated wood does not require brush treatment of end cuts made in the field.
    d. The fire-retardant treated wood has an equilibrium moisture content of not more than 25 percent when tested in accordance with ASTM D3201 procedures at 95 percent relative humidity and 80°F.

1.07 DELIVERY STORAGE AND HANDLING

A. Deliver, store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from moisture and damage. Stack materials to promote air circulation. Protect sheet materials from corner breakage and other damage.

1.08 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner’s Project Manager, Architect, and related subcontractors.

PART 2 - PRODUCTS

2.01 LUMBER

A. Provide kiln dried southern yellow pine or hem-fir construction grade boards, stud grade or no. 2 boards, and structural light framing, complying with applicable requirements of PS 20 “American Softwood Lumber Standards”, and having 19 percent maximum moisture content.

B. Provide above ground lumber and plywood in contact with masonry, concrete and damp proofing that is pressure treated to a level of 0.25 pounds per cubic foot of wood product, with waterborne CCA preservatives in accordance with requirements of AWPA Standard U1 and T1. Pressure treated lumber shall be dried to a maximum moisture content of 15 percent after treatment.

C. Provide UL labeled fire-retardant treated wood in telephone and electrical closets, window framing, and elsewhere as indicated. Provide fire-retardant treatment suitable for interior exposures and comply with AWPA C20. Kiln dry lumber after treatment.

2.02 PLYWOOD

A. Backing panels, interior wall sheathing panels, and continuous or partial partition blocking, shall be APA trademarked, UL labeled, fire-retardant treated, BD, Group 2, Exposure 1 plywood panels not less than 3/4 in. thick at locations of electrical and telephone panels, or 1/2 in. thick for wall sheathing. Panels shall comply with the requirements of PS 1. Plywood shall be fire retardant treated to yield a flame spread rating of not more than 25 when tested according to ASTM E84. Kiln dry after treatment to maximum moisture content of 15 percent.

B. Subflooring: Provide APA trademarked, Exposure 1 Rated and non-rated plywood performance rated sheathing, 3/4 in. thick. Provide tongue and grooved edges. Particleboard and flakeboard are not acceptable.

2.03 FASTENERS AND MISCELLANEOUS MATERIALS

A. Provide size, type, and material appropriate for intended use, as follows:

1. Self-Tapping Screws, surface hardened with a fluoropolymer paint finish equal to Buildex or Stalgard. Threads shall be self-locking to prevent backing out under wind load, vibration, or other stress. A 5/8 in. penetration of the screw through the metal deck is required.
2. Bolts:
    a. Bolts, and nuts shall conform to Fed. Spec. FF-B-571a and FF-B-575, as applicable.
    b. Expansion shields shall conform to Fed. Spec. FF-S-325. Shields shall be accurately recessed and, unless otherwise indicated, shall be not less than 2-1/2 in. into concrete or masonry. Devices of Groups IV, V, VI and VII shall not be used in sizes greater than 3/8 in. unless otherwise indicated.
    c. Lag screws or lag bolts shall conform to Fed. Spec. FF -B-561b.
    d. Toggle bolts shall conform to Fed. Spec. FF-B-588b.
3. Screws: Wood screws shall conform to Fed. Spec. FF-S-111b.
4. Nails: Nails shall conform to Fed. Spec. FF-N-105a. Nails for plywood secured to wood shall be ring or annular type.

B. Provide fasteners with G-90 hot dip galvanized coating, or fluoroploymer coating, at areas of high humidity, including roof blocking and sheathing. Fasteners for use with non-CCA pressure treated lumber, including ACQ Types B and D, CBA-A, and CA-B, shall be stainless steel.

C. Preservative treatment for field cut surfaces of pressure treated blocking and sheathing shall contain 2 percent copper naphthenate complying with AWPA Standard M4. Material shall be Green No. 10, as manufactured by Cuprinol, or equal by WM Barr or Behr.

2.04 FINISHES

A. Paint all surfaces, exposed, and concealed, of plywood backing panels at electrical and telephone panels, and mechanical rooms with fire retardant paint in accordance with requirements of Section 09 91 13 - Painting, and the approved manufacturer's written instructions.

PART 3 - EXECUTION

3.01 INSPECTION

A. The Trade Contractor of this Section shall examine substrates, supports, and conditions under which this Work is to be performed and notify General Contractor, in writing, of conditions detrimental to the proper completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected. Beginning Work means Installer accepts substrates and conditions.

3.02 INSTALLATION / ERECTION

A. Strictly comply with National Forest Products Association, *Manual for House Framing* and building codes, except where more restrictive requirements are specified in this Section or indicated on the drawings.

B. Choose wood members carefully to eliminate split, warped, and twisted members. Set Work to required levels and lines with members plumb and true to line with joints neatly and tightly cut and butted. Securely anchor Work in strict compliance with referenced standards and building code nailing schedule. Countersink bolts and other fasteners flush with face of wood to provide a proper substrate for later Work.

C. Blocking shall be provided as necessary for the applications of sheathing, wallboard and other materials or building items, and to provide fire stopping. Blocking shall be cut to fit between framing members and rigidly attached thereto.

D. Saturate cut ends of treated wood with same chemicals used for original treatment.

E. Install nailers and blocking at metal studs as indicated. All wood shall be pressure treated or fire treated as indicated on drawings. Apply two brush coats of the same preservative used in original treatment to all sawed or cut surfaces of preservative treated lumber.

1. Bolt nailers to deck, not over 24 inches on center. Counter sink bolt heads.
2. Screw nailers to studs, not over 12 inches on center.

3.03 INSTALLATION OF CONSTRUCTION PANELS

A. Reference Standards: Comply with instructions and recommendations of APA, *Design and Construction Guide - Residential and Commercial* for types of panels, nail size and fastening spacing used and applications indicated.

B. Fasten panels as indicated below:

1. Backerboards: Screw to framing or expansion bolt to CMU.
2. Wall Sheathing: Screw to framing or expansion bolt to CMU.

3.04 RUBBISH REMOVAL

A. The General Contractor shall remove and dispose daily all waste and debris in accordance with the requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION

SECTION 06 20 00

FINISH CARPENTRY

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, the following:
   1. Interior standing and running trim.
   2. Fabricated millwork, including but not limited to, the following items:
      a. Wall panels
   3. Back priming of concealed Work
   4. Shop finishing of exposed Work

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
   2. Section 02 41 13 - Selective Demolition
   3. Section 03 54 13 - Cementitious Underlayment
   4. Section 04 20 00 – Unit Masonry
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
   7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
   8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
   9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
   10. DIVISION 09 – FINISHES; including all Sections contained therein.
   11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
   12. Section 14 24 00 – Hydraulic Elevator
   13. Section 21 00 00 – Fire Suppression
   14. Section 22 00 00 – Plumbing
   15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
   16. Section 26 00 00 – Electrical
   17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
   18. Section 28 10 00 – Fire Alarm
   19. Section 31 20 00 – Earth Moving

1.04 QUALITY ASSURANCE

A. Provide Work complying with applicable requirements of AWI *Architectural Woodwork Quality Standards, 6th Edition, Version 1.1*. Where not otherwise indicated, fabricator may choose among options permitted by AWI for grade of Work specified.

B. Softwood lumber shall comply with PS 20 and with applicable grading rules of the respective grading and inspecting agency for the species and product indicated.

C. Plywood shall comply with PS 1/ANSI A 199.1.

D. Hardwood lumber shall comply with National Hardwood Lumber Association (NHLA) rules.

E. Hardwood plywood shall comply with HPVA, PS 51.

F. Provide minimum 42 pounds per cubic foot medium density particleboard complying with requirements of NPA and ANSI 208.1 Standards. Use of the hardboard shall not be allowed.

G. Provide minimum 31 pounds per cubic foot to 55 pounds per cubic foot medium density fiberboard (MDF) complying with National Particleboard Association sponsored ANSI A208.2 *Medium Density Fiberboard for Interior Use*. Moisture content shall be between four and nine percent.

H. All concealed Work in this Section shall be UL labeled fire-retardant treated. Exposed woodwork shall have a flame spread of less than 200. Comply with ASTM E84 – Test Method for Surface Burning Characteristics of Building Materials and AWPA C20 – Structural Lumber Fire Retardant Treatment by Pressure Process.

I. Before beginning primary Work of this Section, provide mock-ups of the following items of Work at locations to be determined by the Architect and obtain the Architect's acceptance of visual qualities. Protect and maintain acceptable mock-ups throughout the Work of this Section to serve as criteria for acceptance of this Work. Acceptable mock-ups may be incorporated into the finished Work as determined by the Architect.

1. Provide the following interior mock-ups, or as otherwise required by the Architect.
    a. Typical interior standing and running trim.
    b. One wood ceiling and wood wall panel and support components
    c. One Display Case
    d. One Section of administrative counter and cabinets
    e. A minimum 10 ft. Section of veneer plywood wall paneling
    f. A minimum 4 ft. Section of built-in wood bench

1.05 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures, and in accordance with requirements of the Contract Documents.

B. Certifications:

1. Submit certification by the treating plant that the fire-retardant treatment materials comply with governing ordinances and that the treatment shall not bleed through finished surfaces.
2. Submit certification from the supplier of the fire-retardant treated lumber or plywood attesting that the wood is Dricon wood or satisfies the following:

a. All pieces of lumber have been kilned dried to a maximum moisture content of 19 percent or less after treatment. All plywood shall be dried to a moisture content of 15 percent after treatment.
b. The fire-retardant chemicals used to treat the lumber were free of halogens, sulfates, ammonium phosphate and formaldehyde.
c. The fire-retardant treated wood does not require brush treatment of end cuts made in the field.
d. The fire-retardant treated wood has equilibrium moisture content of not more than 25 percent when tested in accordance with ASTM D3201 procedures at 95 percent relative humidity and 80° F.

C. Provide large-scale shop drawings, including plans, elevations, details of anchorage's, connections, and accessory items, required for fabrication, installation, and erection of all parts of the Work. Indicate location of both shop and field joints including provisions for controlling or adjusting joint tolerances for field conditions.

D. Take accurate field measurements before preparing shop drawings and fabrication. No field cutting and fitting of factory finished millwork items, except standing and running trim, shall be allowed. The manufacturer shall indicate on his shop drawings all required field dimensions beyond his control. The Trade Contractor of this Section and the millwork manufacturer shall cooperate to establish and maintain these field conditions.

E. Submit at least two fully finished representative samples of each material that is to be exposed in the finished Work, showing the full range of color and finish variations expected. Provide samples having a minimum area of 144 square inches.

F. Submit the approved manufacturer's written certification demonstrating compliance with environmental material requirements in accordance with requirements of the Contract Documents.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products only after wet Work has been completed and environmental conditions similar to finished Work are established and maintained. Store and handle Work to prevent deterioration and damage. Comply with the approved manufacturer and AWI standards and recommendations.

1.07 PROJECT CONDITIONS

A. Maintain optimum environmental conditions to protect woodwork from shrinkage, swelling and all other forms of damage. Millwork installer shall be aware of environmental conditions of the building and shall install his Work to conform to normal moisture conditions and wear and tear within the building.

1.08 WARRANTY

A. All architectural woodwork shall be guaranteed by the woodwork manufacturer/installer to be of good material and Workmanship and free from defects that render it unserviceable for the use for which it is intended. Natural variations in color or texture of the wood are not considered defects. The quality of architectural woodwork shall be safeguarded while in the possession of the Trade Contractor of this Section shall not be stored in damp warehouses or placed in moist or freshly plastered buildings.

B. Woodwork shall not be subjected to abnormal heat or dryness. Permanent heat and air conditioning must be in operation for a sufficient length of time to cure the building before any woodwork or doors are delivered to the site.

C. Woodwork shall be guaranteed for a period of one year from the date of Substantial Completion to repair or replace without charge any woodwork which is defective. Defects shall include, but not be limited to, warping, and twisting of panels or surfaces, delamination of veneers from back-up substrates, failure of hardware components associated with desk and cabinet units, and cracking, chipping, or discoloring of finish systems.

1.09 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner's Project Manager, Architect, and related subcontractors.

1.10 FLAME SPREAD AND SMOKE DEVELOPED LIMITATIONS

A. Interior wall and ceiling finish materials shall be classified in accordance with ASTM E 84 or UL 723. Such interior finish materials shall be grouped in the following classes in accordance with their flame spread and smoke-developed indexes.

1. Class B: Flame spread index 26-75; smoke- developed index 0-450.

PART 2 – PRODUCTS

2.01 FIRE RETARDANT TREATMENT

A. Finish carpentry on fire rated walls and other locations indicated in the drawings shall be pressure impregnated with Dricon fire retardant chemicals in accordance with recommendations and quality control of Hickson Corporation or equal.

2.02 PARTICLE BOARD

A. Provide medium density, 100 percent pre-consumer wood fiber particleboard, no added urea-formaldehyde free, industrial grade particleboard core, Skyblend as manufactured by Roseburg Forest Products or equal, for all plastic laminate Work. Particleboard shall comply with requirements of ANSI A 208.1, Grade M 2.

1. Particleboard shall provide the following minimum performance properties, in accordance with requirements of ASTM D 1037:
   a. Density: 47 lbs./ft3
   b. Thickness: 3/4 in.
   c. MOR: 2,100 psi
   d. MOE: 326,300 psi
   e. Hardness: 500 psi
   f. Face Screw Holding: 225 lbs
   g. Edge Screw Holding: 200 lbs

2.03 MEDIUM DENSITY FIBERBOARD

A. Provide medium density fiberboard, 92 percent pre-consumer, no added urea-formaldehyde, Arreis as manufactured by Roseburg Forest Products or equal. Fiberboard shall comply with requirements of ANSI A 208.2, Grade 130.

1. Fiberboard shall provide the following minimum performance properties, in accordance with requirements of ASTM D 1037:
   a. Density: 47 lbs./ft^3
   b. Thickness: 3/4 in.
   c. MOR: 3,800 psi
   d. MOE: 450,000 psi
   e. Hardness: 950 psi
   f. Face Screw Holding: 225 lbs
   g. Edge Screw Holding: 200 lbs

2.04 INTERIOR STANDING AND RUNNING TRIM

A. Provide Premium Grade materials and workmanship in accordance with AWI 300 requirements.

B. Transparent finished work shall be plain sliced and select white maple veneer with stain finish to match Architect's sample, shall be as specified below under Shop Finishing.

C. The shop assembled casings and frames with accurately mitered joints, pressure glued with pre-manufactured wood biscuits. Where boards are mitered or butted together for moldings, rails, caps, and all other locations, the grains shall be matched as closely as possible and mechanically fastened using "Tight Joint" fastener. Significant visual disparity, or otherwise obvious discrepancies, in grain size or coloration at intersecting members shall be cause for rejection as determined by the Architect.

2.05 FABRICATED MILLWORK

A. Fabricate millwork in configurations as shown on the Drawings. Utilize premium grade materials and workmanship in accordance with AWI Section 400 requirements. Exposed wood surfaces of fabricated millwork shall be 3/4 in. thick, plain sliced white maple veneer with stain finish to match Architect's sample, in profiles as indicated on the Drawings. Millwork shall include, but not be limited to, the following items:

1. Wall panels

a. 3/4 in. plywood sheathing with maple veneer panels, Stain No. 2, Grade No. 1 finish to match Architect's sample. Panel grains shall run vertically, matching, and shall comply in accordance with AWI Section 500 requirements.

2. Solid maple trims and aprons:
   a. 1 in. solid maple, Stain No. 2, Grade No. 1 finish to match Architect's sample. Panel grains shall run vertically, matching, and shall comply in accordance with AWI Section 500 requirements.

B. Fabricate assemblies for installation of all related electric, communication, and technology Work. Provide 2 in. diameter holes and plastic cable grommets with adjustable closing covers in all countertops at 2 ft. O.C., or as otherwise called for in the Drawings.

2.10 PRIMING

A. The work of this Section which has the back side concealed shall be back primed. The primer shall be alkyd pigmented material Cabot Stain Problem Solver Primer 8011 (white) or 8044 (grey) or Benjamin Moore, Moorewood Exterior Primer 094 (white) or a tinted sealer as recommended by the millwork fabricator.

2.11 FINISHING

A.	Shop Finishing:	Provide Premium Grade materials and workmanship in accordance with AWI Section 1500 Factory Finishing requirements.
B.	Field Finishing:	Transparent finish Work at exposed to view wood shall be touched up in the field by the installer required to match shop finishing approved by the Architect.
C.	Field Finishing Opaque Work:	Opaque Work shall be field finished in accordance with requirements of Section 09 91 13 – Painting.

PART 3 - EXECUTION

3.01 INSPECTION

A. The Trade Contractor of this Section shall examine substrates, supports, and conditions under which this Work is to be performed and notify General Contractor, in writing, of conditions detrimental to the proper completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected. Beginning of installation Work means Installer's acceptance of substrates and conditions.

3.02 INSTALLATION

A. Strictly comply with referenced standards. Make sure Work is back primed before Work is installed.
   1. Provide Work to sizes, shapes, and profiles indicated on approved shop drawings.
   2. Install Work to comply with quality standards and tolerances specified for shop Work.
   3. Install Work plumb and level and in perfect alignment.

4. Install in longest practical lengths to minimize joints and seams. (Window stools to be one piece only)
5. Located visible joints and seams only were approved by Architect.
6. Scribe and fit Work neatly and accurately with hairline tight joints in transparent Work.
7. Joints in painted Work shall be invisible after painting.
8. Provide long scarf joints in running Work.
9. Miter and cope joints and seams.
10. Color match wood at joints and seams to minimize expression of joints and seams in transparent finished Work.
11. Secure counter support brackets to conceal blocking in walls to withstand loading specified. Allow for 1/2 in. shim and leveling space above brackets and below underside of countertops.

B. Securely anchor Work to substrates, blocking and grounds with concealed fasteners.

3.03 REPAIRING AND PROTECTION

A. Repair minor damage to eliminate all evidence of repair. Remove and replace Work which cannot be satisfactorily repaired.

B. Provide temporary protection to ensure Work being without damage or deterioration at time of final acceptance. Remove protections and re-clean as necessary immediately before final acceptance.

3.04 RUBBISH REMOVAL

A. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION

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SECTION 07 21 00

THERMAL INSULATION

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK

A. The Work of this Section shall include, but not be limited to, furnishing and installation of the following:
   1. Rigid insulation at foundations.
   2. Closed-cell spray foam insulation at all exterior envelope penetrations from mechanical ductwork and piping, fire protection piping, plumbing, electrical, and technology.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
   2. Section 02 41 13 - Selective Demolition
   3. Section 03 54 13 - Cementitious Underlayment
   4. Section 04 20 00 – Unit Masonry
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
   7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
   8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
   9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
   10. DIVISION 09 – FINISHES; including all Sections contained therein.
   11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
   12. Section 14 24 00 – Hydraulic Elevator
   13. Section 21 00 00 – Fire Suppression
   14. Section 22 00 00 – Plumbing
   15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
   16. Section 26 00 00 – Electrical
   17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
   18. Section 28 10 00 – Fire Alarm
   19. Section 31 20 00 – Earth Moving

1.04 QUALITY ASSURANCE

A. Use adequate numbers of skilled Workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.

B. Provide products which meet or exceed flammability ratings indicated and required by authorities having jurisdiction.

C. Where material thickness is indicated, they are related to the K-values or R-values specified. Provide additional thickness, if necessary, to obtain the same level of performance with acceptable substitute materials which have different values of thermal conductivity. Where R-values are indicated, provide thickness required to achieve value specified.

1.05 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures and in accordance with requirements of the Contract Documents.

B. Submit the following product data:

1. Materials list of items proposed to be provided under this Section.
2. Manufacturers' specifications and other data needed to demonstrate compliance with the specified requirements.
3. Certified test reports for performance required.

C. Furnish a 1 ft. x 1 ft. sample of each type of insulation specified, labeled with manufacturer's name, thickness, and location of use.

1.06 PRODUCT HANDLING

A. Provide all means necessary to protect the materials of this Section before, during, and after installation and to protect installed Work and materials of all other trades.

B. Repair and replacement of damage to the Work of this Section, as determined by the Architect, shall be completed immediately at no additional cost to the Owner.

1.07 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner’s Project Manager, Architect, and related subcontractors.

PART 2 - PRODUCTS

2.01 RIGID INSULATION AT FOUNDATIONS

A. At exterior wall locations other than brick masonry veneer, provide rigid, closed cell, Extruded Polystyrene (XPS) insulation Foamular 250 by Owens Corning, or equal STYROFOAM Scoreboard by Dow Chemical or Amoco Foam Products. Insulation shall comply with the following characteristics:

1.	R-Value:	5.0 per inch at 75 deg. F mean temperature, ASTM C518
2.	Compressive Strength:	25 psi min., ASTM D1621
3.	Flexural Strength	50 psi min., ASTM C203
4.	Water Absorption:	0.3 percent max. by volume, ASTM C272
5.	Water Vapor Permeability:	1.5 max. perm, ASTM E96
6.	Dimensional Stability:	2 percent max. linear change, ASTM D2126
7.	Flame Spread:	10, in accordance with ASTM E84
8.	Smoke developed:	175, in accordance with ASTM E84
9.	Standard Fire Test:	NFPA 285
10.	Thickness:	3-1/2 inches
11.	Size:	48 in. x 96 in., square edge to fit cavity wall tie spacing

2.02 CLOSED-CELL SPRAY FOAM INSULATON

A. Provide two-component closed-cell spray polyurethane foam insulation utilizing an EPA approved zero ozone depleting blowing agent, Walltite LWP as manufactured by BASF or equal by Foam-Lok or Icynene. The foam insulation shall be sprayed at interior surface of exterior sheathing. The closed-cell spray foam insulation shall comply with the following properties:

1.	Thickness:	6 in.
2.	Specific Gravity at 70 deg. F:	1.21, ASTM D1638
3.	Viscosity at 70 deg. F (cps):	1050-1350, Brookfield
4.	Density Core (pcf at 2 in. lifts):	2.20-2.40, ASTM D1622
5.	Thermal Resistance (aged):	0.138 / 1 in. thick at <3.5 in., ASTM C518
6.	Compressive Strength (psi):	26 +/- 5 percent, ASTM D 1621
	Water Vapor Transmission (Perm Inch):	1.28, ASTM E96
7.	Water Vapor Transmission (Perms):	<1.0 at 1.50 in. thickness, ASTM E96
8.	Water Absorption (vol percent):	<0.30, ASTM D2842
9.	Closed Cell Content (percent):	>90, ASTM D6226
10.	Surface Burning Characteristics:	
	Flame Spread Index:	<25, ASTM E84
	Smoke Developed Index:	<450, ASTM E84
11.	Noise Reduction Coefficient:	0.1, ASTM C423

2.03 CONSTRUCTION ADHESIVE

A. Provide rubber based, solvent dispersed, adhesive designed for bonding extruded polystyrene to construction materials, Styrofoam Construction Adhesive, as manufactured by Dow Chemical Company or equal by Owens Corning or Amoco Foam Products.

B. Provide written confirmation from approved insulation manufacturer that construction adhesives are compatible with specified Air /Vapor Barrier.

PART 3 - EXECUTION

3.01 INSPECTION

A. The Contractor for this Section shall examine substrates, supports, and conditions under which this Work is to be performed and notify General Contractor, in writing, of conditions detrimental to the proper completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected. Beginning Work means Installer accepts substrates and conditions.

3.02 RIGID INSULATION INSTALLATION

A. Strictly comply with manufacturer's instructions and recommendations, except where more restrictive requirements are specified in this Section. Install insulation between all heated and unheated spaces.

1. Clean substrates and remove projections which could puncture vapor barriers.
2. Extend insulation over entire area indicated to be insulated.
3. Fit tightly around penetrations and obstructions. Fill all holes, gaps, and voids.
4. Do not over compress insulation.
5. Provide insulation in one layer with tightly butted edges, unless indicated otherwise.

B. Board Type Insulation at Cavity Walls: Attach insulation to cavity walls as per manufacturers recommendations. All panels shall be butted snugly with no gaps greater than 1/4 inch. Gaps greater than 1/4 inch shall be filled with the same material. Insulation panels may be applied to cavity walls while air barriers are tacky. Insulation manufacturers shall verify compatibility with air barrier materials.

C. Extruded Polystyrene Foam Insulation: Concrete and insulating concrete surfaces shall be protected from traffic or damage until surfaces have hardened sufficiently. If necessary, 1/2 in. thick plywood sheets shall be used to protect the exposed surface.

3.03 SPRAY FOAM INSULATION INSTALLATION

A. The Trade Contractor and applicators for this Section shall comply with the manufacturer’s storage, handling, processing, and safety guidelines. Appropriate respiratory, skin and eye Personal Protective Equipment (PPE) when handling and processing polyurethane chemical systems. Personnel should review the following documents published by Spray Polyurethane Foam Alliance (SPFA): AX-171 Course 101-R Chapter 1: Health, Safety and Environmental Aspects of Spray Polyurethane Foam and Coverings.

B. Clean substrate prior to applying spray foam insulation.

C. Spray foam insulation is combustible. High intensity heat sources such as welding or cutting torches must not be used in contact with or close to polyurethane foam insulation.

D. Application rate of 1/2 in. min. to 2 in. max. per pass. Once spray foam insulation is installed and the material has cooled, it is possible to add additional applications to increase the overall installed thickness. Thicker installations are allowed, based on large scale testing.

3.04 PROTECTION

A. Provide temporary protection to ensure Work being without damage or deterioration from weather or physical abuse. Repair and replacement of damage to the Work of this Section, as determined by the Architect, shall be completed immediately at no additional cost to the Owner.

3.05 RUBBISH REMOVAL

A. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION

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SECTION 07 25 00

WEATHER BARRIERS
(Filed Sub-Bid Required)

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 FILED SUB-BID REQUIREMENTS

A. Sub-bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the Enter Name and Address for Place of Bid Openging at time and place stipulated in the "Invitation to Bid/Notice to Contractors".

Name of Sub-Bidder:

Project:	Worcester Public Schools ADA Upgrades for Challenge & Reach, Gerald Creamer, Lincoln, and Thorndyke Schools.
Sub-Bid for Section:	07 25 00 – Weather Barriers

B. Each sub-bid submitted for work under this Section shall be on forms furnished by the City of Worcester as required by Section 44F of Chapter 149 of the General Laws, as amended. Sub-Bid forms may be obtained at the Enter Name and Address of location where forms may be obtained in person, or by written request.

C. Sub-bids filed with the City of Worcester shall be accompanied by a BID BOND or CASH or CERTIFIED CHECK or a TREASURER'S or CASHIER"S CHECK issued by a responsible bank or trust company payable to the City of Worcester in the amount of five (5) percent of the bid. A sub-bid accompanied by any other form of bid deposit than those specified will be rejected.

D. The Sub-Bidder of this Section shall include Work of the following Sections:
   1. 07 27 26 - Fluid-Applied Membrane Air Barriers
   2. 07 92 00 – Joint Sealants

E. The Sub-Bidder of this Section shall examine all drawings and specification sections for requirements affecting the Work of this Section as shown primarily in the following drawings:
   1. Lincoln Elementary School: A1.01 through A12.01.
   2. Thorndyke Road Elementary School: A1.01 and A9.01.

F. The Sub-Bidder of this Section shall examine other drawings and specification sections that could affect the Work of this Section as it relates to coordination. The other drawings are the following:
   1. Lincoln Elementary School: D1.01 through D7.01; S0.01 through S1.02; FP1.01 through FP1.03; DP1.01 and P1.01; ED.1 through FA.2; DH1.01 and H1.01; VT.01.
   2. Thorndyke Road Elementary School: D1.01 through D7.01; S0.01 through S2.01; FP1.01 through FP1.03; DP1.01 through P1.02; ED.0 through FA.3; H1.01 and H1.03; VT.02.

1.03 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:

1. Below slab vapor barrier
2. Foundation damp proofing.
3. Waterproofing membrane.
4. Water based adhesives.
5. Protection of completed Work.

1.04 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
2. Section 02 41 13 - Selective Demolition
3. Section 03 54 13 - Cementitious Underlayment
4. Section 04 20 00 – Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.05 QUALITY ASSURANCE

A. The Work of this Section shall be performed by manufacturer approved applicators having a minimum of five (5) years application experience with the required materials.

B. For each type of material required for the Work of this Section, provide primary materials which are the products of one manufacturer. Provide secondary materials which are acceptable to the manufacturers of the primary materials.

C. Make all arrangements and payments necessary to have the approved manufacturer's authorized representative on-site at beginning of waterproofing to advise installer and to ensure compliance with manufacturer's requirements.

D. Provide materials suitable for the intended use and compatible with the materials with which they shall be in contact. Compatibility of sealants and accessories shall be verified in writing by the approved manufacturer.

1.06 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures and in accordance with requirements of the Contract Documents.

B. Submit manufacturer's product data, installation instructions, use limitations and recommendations for each material and system required by the Work this Section.

1. Prior to ordering waterproofing materials, the Waterproofing Subcontractor of this Section shall submit the items listed below to the Architect for approval:
    a. 3 copies of manufacturer's specifications for proposed products and installation instructions.
    b. Written approval of manufacturer’s use of the products in the proposed system.
    c. Specimens copy of membrane manufacturer's warranty.
    d. Dimensioned shop drawings indicating areas of Work, membrane layout and profile details of flashing methods for penetrations and terminations. It shall be the manufacturer's responsibility to verify compatibility with surrounding materials, especially at interface with other types of waterproofing.

C. Provide samples as follows:

1. Submit representative samples of each control joint, sealant and expansion joint specified herein, showing the full range of color and finish variations expected. Provide actual samples having a minimum length of 6 inches.
2. Provide samples of each waterproofing material to be used in the systems described herein, including primers, mastics, tapes, liquid waterproofing, termination bars and fasteners, protection, and drainage composite boards.

D. Provide certifications as follows:

1. Provide manufacturer's certification of sealant and joint material performance, including compatibility with adjacent materials to which material shall be applied. Provide certified test reports on aged performances, hardness, stain resistance, adhesion, cohesion and tensile strength, low temperature flexibility, elongation, modules of elasticity, water absorption, and the resistance to weight loss and deterioration due to heat, ozone, and ultraviolet exposure.
2. Submit the approved manufacturer’s written certification demonstrating compliance with environmental material requirements in accordance with requirements of the Contract Documents, as necessary for compliance with and completion of the High-Performance School Initiatives Criteria Scorecard by the Owner.

1.07 REFERENCE STANDARDS

A. The following standards and publications are applicable to the extent referenced in the text.

B. American Society for Testing and Materials (ASTM):

1. C 836 Standard Specification for High Solids, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course

2. D 412 Standard Test Methods for Rubber Properties in Tension
3. D 570 Standard Test Method for Water Absorption of Plastics
4. D 903 Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
5. D 1876 Standard Test Method for Peel Release of Adhesives (T-Peel)
6. D 1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
7. D 3767 Standard Practice for Rubber - Measurements of Dimensions
8. D 5385 Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes
9. E 96 Standard Test Methods for Water Vapor Transmission of Materials
10. E 154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

1.08 QUALITY ASSURANCE

A. Sheet membrane waterproofing system shall be manufactured and marketed by a firm with a minimum of 20 years' experience in the production and sales of sheet membrane waterproofing. Manufacturers proposed for use but not named in these specifications shall submit evidence of ability to meet all requirements specified and include a list of projects of similar design and complexity completed within the past 5 years.

B. Installer: A firm which has at least 3 years' experience in work of the type required by this section.

C. Materials: For each type of material required for the work of this section, provide primary materials which are the products of one manufacturer.

D. Schedule Coordination: Schedule work such that membrane will not be left exposed to weather for longer than that recommended by the manufacturer.

1.09 MOCK-UP

A. Provide mock-up before beginning Work of this Section at location acceptable to Architect and obtain Architect's acceptance of visual and performance characteristics. Protect and maintain acceptable mock-ups throughout the Work of this Section to serve as criteria for acceptance of this Work. Acceptable mock-ups may be incorporated into the finish Work. Mock-ups shall be as follows:

1. 100 square feet under slab vapor barrier, including penetration flashing.

1.10 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products to the job site in original, unopened package, clearly labeled with the manufacturer's identification and printed instructions. All material shall be stored and handled in accordance with the manufacturer's instructions and recommendations. Protect from damage.

1.11 PROJECT CONDITIONS

A. Perform Work only when ambient conditions are within the limits established by manufacturers of the materials and products used.

B. Proceed with Work related to composite sheet waterproofing only when substrate construction and penetrating Work is complete, and concrete or mortar has cured for at least 28 days.

C. Provide ventilation in accordance with the approved manufacturer's written requirements and recommendations throughout application and curing for all materials specified in this Section.

1.12 WARRANTY

A. Provide a written warranty signed by the approved manufacturer for a period of 10 years from the date of Substantial Completion and Installer warranty for a period of one year for all materials provided under the Work of this Section.

1.13 CUTTING AND CORING

A. The installation of new Work that requires cutting and coring of floors, walls, and roofs with dimensions 5-1/2 in. or less shall be performed by the Subcontractor of this Section. The General Contractor shall cut and core floors, walls, and roofs with dimensions not indicated by the Subcontractor of this Section.

1.14 SCAFFOLDING AND EQUIPMENT

A. The Subcontractor of this Section shall provide, maintain, and safely remove when no longer required, interior and exterior staging, scaffolding, hoists, and all other related equipment to comply with all applicable Federal, State, and local regulations and codes.

1.15 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner’s Project Manager, Architect, and related subcontractors.

B. Advise other trades to ensure that no other Work adversely effects sealer bonding surfaces.

PART 2 - PRODUCTS

2.01 VAPOR BARRIER

A. Provide vapor barrier below concrete slabs-on-grade Class A, polyolefin vapor barrier, Stego Wrap as manufactured by Stego Industries LLC, Perminator by W.R. Meadows, VaporBlock by Raven Industries, or equal. The vapor barrier shall comply with the requirements of ASTM E 1745. Vapor barriers shall be manufactured using prime virgin resins and additives in a multi-layer extrusion process.

B. Vapor Barrier shall comply with the following minimum performance characteristics:

1.	Permeance:	Less than 0.01 perms [grains/(ft2/hr/inHg)] as tested with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5)
2.	Puncture Resistance:	2,200 grams, ASTM D1709
3.	Tensile Strength:	45.0 lbs./in, ASTM D882

4. Methane Transmission Rate: ASTM D1434
5. Roll Dimensions: 14 ft. x 140 ft.
6. Thickness: 15 mils

C. Provide the approved manufacturer's required accessories, including joint sealant tape for complete installation.

2.02 PRE-SEAL WATERPROOFING MEMBRANE

A. Provide pre-applied, self-adhering sheet waterproofing membrane, Blueskin PreSeal 435 as manufactured by Henry or equal by. The pre-applied waterproofing membrane is fully, and permanently bonded polypropylene membrane laminated to a chemically enhanced non-woven geotextile fleece with a dimpled surface and adhesive to provide mechanical attachment to wet concrete that forms a permanent barrier seal, having the following typical properties:

1. Resistance to hydrostatic head (ASTM D5385): 231 ft. (70.4m)
2. Water absorption (ASTM D570): 0.4%
3. Lateral migration resistance (ASTM D5385 Modified): 231 ft. (70.4m)
4. Puncture resistance (ASTM E154): 225 lbs (1000 N)
5. Lap peel adhesion (ASTM D1876): 6.9lbs/in (1200 N/m)
6. Permeance (ASTM E96): <0.01 Perms
7. Peel adhesion to concrete (ASTM D903): 5 lbs/in (875 N/m)

B. Provide two-part prefabricated geo-composite drain board consisting of a formed polystyrene core covered on one side with a woven or non-woven polypropylene filter fabric, MiraDRAIN as manufactured by Henry or equal.

C. Provide moisture cure, STPE polymer-based sealant Henry 925 BES.

D. Provide Tape double-sided, acrylic adhesive tape, Blueskin PreSeal Tape 50S or equal.

E. Provide pre-formed, high-impact resistant, heavy-duty thermoplastic cover designed to protect the waterproofing membrane integrity at soil retention tie-back systems, Henry Tie-Back Cover or equal.

2.03 BLINDSIDE WATERPROOFING MEMBRANE

A. Provide SBS modified bitumen with a cross-laminated polyethylene film, blindside self-adhering sheet membrane, Blueskin WP200 as manufactured by Henry or equal. The waterproofing membrane shall comply with the following properties:

1. Thickness: 1.5 mm (60 mils.) min.,
2. Flexibility: Pass @ -40 degrees C to ASTM D1970
3. Vapor permeance: 2.8 ng/Pa.s.m² (0.05 perms) to ASTM E96,
4. Tensile strength (membrane): 2.24 MPa to ASTM D412,
5. Tensile strength (film): 34.5 MPa to ASTM D882,
6. Elongation: 300% to ASTM D412,
7. Puncture resistance: 222 N min. to ASTM E154.

B. Provide primer for self-adhering membranes at temperatures above 25 degrees F shall be Aquatac Primer manufactured by Henry or equal, a polymer emulsion-based adhesive, quick setting, having the following physical properties:

1. Colour: Aqua;

2. Weight: 8.7 lbs/gal;
3. Solids by weight: 53%;
4. Water based, no solvent odours
5. Drying time (initial set): 30 minutes at 50% RH and 70 degrees F;

C. Provide liquid membrane and termination sealant, HE925 BES Sealant manufactured by Henry or equal. The sealant shall be a moisture cure, medium modulus polymer modified sealing compound having the following physical properties:

1. Compatible with sheet air barrier, roofing and waterproofing membranes and substrate,
2. Complies with Fed. Spec. TT-S-00230C, Type II, Class A
3. Complies with ASTM C 920, Type S, Grade NS, Class 25
4. Elongation: 450 – 550%
5. Remains flexible with aging
6. Seals construction joints up to 1 inch wide

2.04 WATER BASED ADHESIVE

A. Provide water-based acrylic adhesive containing emulsified bentonite to fill cracks and voids in wall and pipe penetrations, Clay-Tite as manufactured by W.R. Meadows or equal. The adhesive shall comply with the following properties:

1. Strength: 25 lbs., ASTM D1004
2. % Elongation at Break: 125%, ASTM D412
3. Hardness: ~90 Shore A, ASTM D2240, Procedure A
4. Unrestricted Expansion: 100%
5. Resistance to Hydrostatic Head: 100 ft., ASTM D751, Procedure A
6. Vapor Permeability: 1×10^{-9} cm per sec
7. Functional Temperatures: -15 deg. – 120 deg. F, STM D746
8. Color: Gray/White

2.05 PRE-FABRICATED DRAINAGE BOARD

A. Provide two-part prefabricated geo-composite drain board with additional film attached to back side of membrane, consisting of a formed polystyrene or PVC core covered on one side with a woven or non-woven polypropylene filter fabric, DB 500, as manufactured by Henry, or equal by WR Meadows or PolyGuard Products. Drainage board shall comply with the following material and performance characteristics:

1. Material: Polystyrene
2. Thickness: 7/16 in.
3. Compressive Strength: 15,000 lbs./SF
4. Flow Capacity: 16 gpm
5. Tensile Strength: 110 lbs.
6. Puncture Strength: 65 lbs.

B. Provide continuous 1/4 in. x 3/4 in. HDPE securement bar for screw attachment.

C. Provide continuous 3-1/2 in. wide ‘Z’ flashing moulding strip to fit over exposed top edge of drain board.

D. Provide HDPE pre-molded washer to fit dimples, complete with high strength, corrosion resistant concrete nails, UCAN AFH 37 or equal.

2.06 FOUNDATION DAMPPROOFING

A. Provide brush/spray applied emulsion dampproofing, asphalt based, clay emulsion with fibers, Sealmastic Type II as manufactured by W.R. Meadows or equal by Karnak or Carlisle. Dampproofing shall comply with the following properties:

1. ASTM D1227, Type II, Class 1
2. Coverage: 40 to 50 sq. ft. /gal.
3. Shelf Life: Within one year of date of manufacture
4. VOC: 0 g/L
5. Color: Black
6. Application: Spray or Brush

PART 3 - EXECUTION

3.01 INSPECTION

A. The Waterproofing Subcontractor shall examine substrates, supports, and conditions under which the Work of this Section is to be performed and notify the General Contractor, in writing, of conditions detrimental to the proper completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected. Beginning Work means Installer accepts substrates and conditions.

B. Strictly comply with the approved manufacturer's written instructions and recommendations, except where more restrictive requirements are specified in this Section.

3.02 SUBSTRATE PREPARATION FOR WATERPROOFING

A. It is essential to create a sound and solid substrate to eliminate movement during the concrete pour. Substrates must be regular and smooth with no gaps or voids greater than 0.5 in. Grout around all penetrations such as utility conduits, for stability.

1. Horizontal Surfaces: The substrate must be free of loose aggregate and sharp protrusions. Avoid curved or rounded substrates. When installing over earth or crushed stone, ensure substrate is well compacted to avoid displacement of substrate due to traffic or concrete pour. The surface does not need to be dry but standing water must be removed.
2. Vertical Surfaces: Use concrete, plywood, insulation or other approved facing to sheet piling to provide support to the membrane. Board systems such as timber lagging must be close butted to provide support and not more than 0.5 in. out of alignment.

3.03 WATERPROOFING INSTALLATION

A. Horizontal Applications: Strictly comply with installation instructions in manufacturer’s published literature, including but not limited to, the following:

1. Place the membrane HDPE film side to the substrate with the clear plastic release liner facing towards the concrete pour. End laps should be staggered to avoid a build-up of layers.
2. Leave the plastic release liner in position until the overlap procedure is completed.
3. Accurately position succeeding sheets to overlap the previous sheet 3 in. along the marked selvedge. Ensure the underside of the succeeding sheet is clean, dry, and free from contamination before attempting to overlap.

4. Peel back the plastic release liner from between the overlaps as the two layers are bonded together. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller.
5. Completely remove the plastic liner to expose the protective coating. Any initial tack will quickly disappear.

B. Vertical Applications: Strictly comply with installation instructions in manufacturer's published literature, including but not limited to, the following:

1. Where desired mechanically fasten the membrane vertically using fasteners appropriate to the substrate with the clear plastic release liner facing towards the concrete pour. The membrane may be installed in any convenient length.
2. All mechanical fastening shall be through the selvedge using a small and low-profile head fastener so that the membrane lays flat and allows firmly rolled overlaps.
3. Immediately remove the plastic release liner.
4. Ensure the underside of the succeeding sheet is clean, dry, and free from contamination before attempting to overlap.
5. After placement roll firmly to ensure a watertight seal.
6. Overlap all roll ends and cut edges by a minimum 3 in. and ensure the area is clean and free from contamination, wiping with a damp cloth if necessary.
7. Allow to dry and apply tape centered over the lap edges and roll firmly.
8. Immediately remove printed plastic release liner from the tape.

3.04 FIELD QUALITY CONTROL / TESTING

A. Installation of concrete floor slab applied over the waterproofing shall not commence until the membrane is inspected and approved for its intended use by the Architect.

3.05 REPAIR AND CLEANING

A. Remove and replace Work which is damaged or deteriorated in any respect.

B. Clean adjacent surfaces using materials and methods recommended by system manufacturer. Remove and replace Work that cannot be successfully cleaned.

3.06 RUBBISH REMOVAL

A. The Subcontractor of this Section shall stockpile and drop daily all wastes and debris at areas designated by the General Contractor.

B. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION

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SECTION 07 27 26

FLUID-APPLIED MEMBRANE AIR BARRIERS
(Part of the Work of Section 07 25 00 – Weather Barriers, Filed Sub-Bid Required)

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 FILED SUB-BID REQUIREMENTS

A. The Work of this Section shall be included as Part of the Work of Section 07 25 00 – Weather Barriers, stipulated as a Filed Sub-Bid under Paragraph D, Item 2 of the Form for General Bid.

B. The Sub-Bidder of Section 07 25 00 – Weather Barriers shall examine all Drawings and all Sections for requirements affecting the Work of this Section as shown primarily in the following drawings:

1. Lincoln Elementary School: A1.01 through A12.01.
2. Thorndyke Road Elementary School: A1.01 and A9.01.

C. The Sub-Bidder of Section 07 25 00 – Weather Barriers shall examine other drawings and specification sections that could affect the Work of this Section as it relates to coordination. The other drawings are the following:

1. Lincoln Elementary School: D1.01 through D7.01; S0.01 through S1.02; FP1.01 through FP1.03; DP1.01 and P1.01; ED.1 through FA.2; DH1.01 and H1.01; VT.01.
2. Thorndyke Road Elementary School: D1.01 through D7.01; S0.01 through S2.01; FP1.01 through FP1.03; DP1.01 through P1.02; ED.0 through FA.3; H1.01 and H1.03; VT.02.

1.03 DESCRIPTION OF WORK

A. The Work of this Section shall include, but not be limited to, furnishing and installation of the following:

3. Fluid applied air and vapor barrier at exterior wall assemblies.
4. Fluid applied vapor permeable air and water barrier at exterior wall assemblies.
5. A self-adhered air barrier membrane to provide air and watertight closure at all penetrations at exterior wall assemblies for electrical, plumbing, mechanical, fire protection, and structural.
    a. Strongly recommend fluid applied transition membrane (FATM) instead of self-adhered at least for the hundreds of small penetrations. Simpler and far easier to meet MI therefore much less likely to leak.
6. Related accessories necessary for a complete installation
7. Liquid-Applied Flashing at exterior wall assemblies.

B. Items to be Furnished Only: Furnished self-adhered air barrier membrane for installation by the designated Sections:

1. 04 20 00 – Unit Masonry

1.04 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
2. Section 02 41 13 - Selective Demolition
3. Section 03 54 13 - Cementitious Underlayment
4. Section 04 20 00 – Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.05 REFERENCES

A. American Society for Testing Materials (ASTM):

1. D 412 Standard Test Methods for Rubber Properties in Tension
2. D 903 Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
3. D 1644 Test Methods for Nonvolatile Content of Varnishes
4. D 1970 Standard Specification for Self-Adhered Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
5. D 3767 Standard Practice for Rubber - Measurements of Dimensions
6. E 2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
7. E 283 Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

1.06 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures and in accordance with requirements of the Contract Documents.

B. Submit manufacturer's product data for each material, including but not limited to, standard details, certified test results, installation instructions, and recommendations for sealing penetrations and perimeter.

C. Submit three labeled samples of each product, not less than 6 by 12 inches in size.

D. Submit shop drawings for mockup indicating size of mockup, details of construction, and expansion and control joints. Include relationship with adjacent materials, sequence of installation and materials and methods for sealing penetrations. Obtain approval of shop drawings prior to construction of mockup. Revise to show changes necessary to obtain approval of mockup.

E. Submit large scale shop drawings indicating details of construction, including expansion and control joints. Include relationship with adjacent materials, sequence of installation and materials and methods for sealing penetrations. Shop drawings shall include, but not be limited to, details of the following connections, as applicable to the project:

1. Foundation and walls
2. Wall systems and windows, doors, louvers, and all other exterior wall penetrations
3. Different exterior wall systems
4. Wall and roof assemblies
5. Walls, floor and roof across construction, control, and expansion joints
6. Walls, floors and roof to utility, pipe, conduit, duct, and all other penetrations

F. Submit qualifications of firm installing air barrier membrane materials, including name and qualifications of supervisor for this project, and including name and location of three projects where similar Work was performed by both firm and supervisor.

G. Prior to installation on the building, the General Contractor shall construct a mockup of the typical exterior wall assembly, including connection between wall and roof, and connection between wall and exterior door and window glazing to indicate relationship of materials with air barrier and quality of Workmanship. The Waterproofing Subcontractor shall use the actual air barrier membrane, wall, window, and roof detail materials on the wall mock-up provided by the General Contractor. The General Contractor shall provide several mockups if necessary to include the various conditions. The General Contractor shall remove mockup assemblies from site at completion of project. The Waterproofing Subcontractor shall be responsible for all costs associated with rebuilding mockups which are not approved at no additional cost to the Owner.

1. The mockup shall be constructed in accordance with details indicated on the Drawings for the respective building components required to be included in the mockup as described above.

1.07 FIELD TESTING OF MOCK-UP

A. Provide the services of an independent testing agency to perform static diagnostic and qualitative testing of the exterior wall mockup including window penetration and roof to wall intersection. Testing shall be conducted in accordance with requirements Section 01 91 17 - Mock-Up Testing, and the following:

1. Install air seal components and assemblies to resist air leakage caused by static air pressure across exterior wall assemblies and other interruptions to the integrity of the building enclosure systems.
2. Condition the sample by cycling in four pounds per square foot increments to 40 pounds per square foot, or to the highest pressure below 40 pounds per square foot practical without damaging components and return pressure to zero prior to commencing test.
3. Test to pressure differential of 0.3 in. water as specified in code and as measured in accordance with requirements of ASTM E 283.
4. If the assembly fails to meet performance value of not more than 0.03 cubic feet per minute per square foot air leakage, determine cause, rebuild assembly and retest until assembly passes, at no additional expense to the Owner.

B. Qualifications of Testing Laboratory: Testing shall be performed by an acceptable independent testing laboratory listed in Section 01 91 17 – Mock-up Testing. If requested, submit to the Architect and General Contractor, qualifications of laboratory using criteria conforming to ASTM E 699.

1.08 QUALITY ASSURANCE

A. Installer shall be a firm with a minimum of 3 years experiences in Work of the type required by this Section.

B. All components of the air barrier system, including but not limited to, primers, membrane, and flashings shall be the products of a single manufacturer to provide a manufacturer warranty, fully compatible system complying with requirements of the Massachusetts Energy Code. The Waterproofing Subcontractor Section shall provide manufacturer verification of compatibility between all materials and components provided under the Work of this Section and its' related Sections.

1.09 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products in labeled packages. Store and handle in strict compliance with manufacturer's instructions, recommendations, and material safety data sheets. Protect from damage from sunlight, weather, excessive temperatures, and construction operations. Remove damaged material from the site and dispose of in accordance with applicable regulations.
1. Do not double-stack pallets of waterproofing on the job site. Provide cover on top and all sides, allowing for adequate ventilation.
2. Protect waterproofing materials from freezing. In cool temperatures, store the material for several hours at room temperature to facilitate mixing and application.

B. Sequence deliveries to avoid delays but minimize on-site storage.

1.10 PROJECT CONDITIONS

A. Perform Work only when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials and products used.

B. Proceed with installation only when substrate construction and preparation Work is complete and in condition to receive membrane waterproofing.

1.11 WARRANTY

A. Standard Product Warranty:
   1. Submit manufacturer's warranty that air & vapor barrier and accessories are free of defects at time of delivery and are manufactured to meet manufacturer's published physical properties and material specifications. The warranty period shall be a minimum of 5 years.
   2. Installer to warrant for a period of 2 years that air & vapor barrier and accessories have been installed in accordance with manufacturer's recommendations.

1.12 CUTTING AND CORING

A. The installation of new Work that requires cutting and coring of floors, walls, and roofs with dimensions 5-1/2 in. or less shall be performed by the Subcontractor of this Section. The General Contractor shall cut and core floors, walls, and roofs with dimensions not indicated by the Subcontractor of this Section.

1.13 PRE-INSTALLATION MEETING

A. After approval of mockup shop drawings, but prior to construction of mock-up, the General Contractor shall convene a meeting with representatives of materials to be incorporated in the mockup and installers of mockup. The agenda shall include sequence and details of construction to ensure continuity of air barrier.

B. The General Contractor shall schedule a pre-installation meeting a minimum of one week prior to substrate application Work of this Section. Attendees shall include representatives of air barrier manufacturer, exterior wall installers, project superintendent, and Architect. Agenda shall include the following:
   1. Review of approved submittals
   2. Review of mock-ups
   3. Coordination with sequence of installation with adjacent materials
   4. Schedule for subsequent Work covering air barrier.
   5. Procedures for quality assurance

PART 2 - PRODUCTS

2.01 AIR AND VAPOR BARRIER

A. Air / Vapor Barrier shall be fluid applied, Air-Bloc 16MR, as manufactured by Henry, or equal by W.R. Meadows or GCP, meeting the following physical properties and 780 CMR 13 Energy Conservation Requirements.

1.	Air Permeance:	.0013 CFM/ft^2 or less, in accordance with ASTM E 2178
2.	Water Vapor Permeance:	0.03 perms, in accordance with ASTM E 96
3.	Elongation:	270 percent minimum, in accordance with ASTM D 412
4.	VOC Content:	50 g/L, or less
5.	Thickness:	60 mils DFT; 75 WFT
6.	Min. Application Temp:	+20 deg. F

2.02 SELF-ADHERED AIR BARRIER MEMBRANE

A. Provide self-adhered air barrier membrane as recommended by approved air /vapor barrier manufacturer. Self-Adhered air barrier membrane at all penetrations shall be Blueskin SA, as manufactured by Henry, or equal by W.R. Meadows. All air barrier components shall be provided by a single manufacturer to insure a complete system and compatibility between all components.

1. Membrane shall be comprised of Self-Adhered rubberized asphalt integrally bonded to high density, cross laminated, polyethylene sheeting. All membranes shall include an edge bead as an integral part of the membrane at all side laps. The absence of an edge bead shall constitute rejection of the membrane and all Work shall be deemed unacceptable. Membrane types shall be used as follows:
   a. Detail Membrane: 36 mils rubberized asphalt and 4 mils cross laminated polyethylene, for use at locations not in direct contact with masonry, for tie into windows and doors.
   b. Wall Flashing: 32 mils rubberized asphalt and 8 mils cross laminated polyethylene, for use at locations where masonry materials shall be placed onto membrane.
   c. Joint Sealant - Joints in exterior silicone treated sheathing, at all dissimilar materials, transitions, and at masonry and insulation fastener locations shall be treated with the approved manufacturer's recommended sealant, HE925 BES Sealant, as manufactured by Henry or equal.
2. Provide the approved manufacturer's recommended surface conditioner, primer, mastics, and adhesives in accordance with requirements of the approved manufacturer's written requirements and requirements of the Contract Documents.

2.03 LIQUID-APPLIED FLASHING

A. Provide liquid-applied flashing as recommended by approved air /vapor barrier manufacturer. The liquid applied flashing at all penetrations, joints, corners of exterior wall assembly shall be Air-bloc LF as manufactured by Henry or equal by W.R. Meadows or GCP. The liquid-applied flashing shall comply with the following properties:

1. Color: Blue
2. Elongation, min: 264%, ASTM D412, modified.
3. Tensile Strength, min: 132 psi (910 kPa), ASTM D412, modified.
4. Crack Bridging: Pass, ASTM C1305
5. VOC Content, max: <25 g/L
6. Moisture Absorption: 0.1%, ASTM D570-81
7. Water Resistance: Pass, AC212, ASTM D2247
8. Air Leakage @75 Pa: ≤ 0.004 CFM/ft2, (≤ 0.02 L/[sm2]) ASTM E2178

PART 3 - EXECUTION

3.01 EXAMINATION

A. The Waterproofing Subcontractor of this Section shall examine conditions of substrates and other conditions under which this Work is to be performed and notify the General Contractor, in writing, of circumstances detrimental to the proper completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected.

3.02 PREPARATION OF SUBSTRATES

A. Preparation of substrates shall comply with the approved manufacturer's written requirements, and the Contract Documents. Surfaces shall be structurally sound and free of voids, spalled areas, loose aggregate, and sharp protrusions. Remove contaminants such as grease, oil, and wax from exposed surfaces. Remove dust, dirt, loose stone, and debris. Use repair materials and methods in accordance with the approved air barrier manufacturer's written requirements.

B. Masonry Substrates:

1. Air barrier application may commence as soon as the substrate can accept loading. Mortar joints shall be struck full and flush, with no laitance or protrusions.

C. Treat joints and install flashing in accordance with written requirements of the approved silicone treated gypsum sheathing and air barrier manufacturer.

3.03 INSTALLATION OF AIR BARRIER MEMBRANE AT FOUNDATION AND EXTERIOR WALLS

A. Coordinate installation of the Work of this Section with the Work of Section 07 25 00 – Weather Barriers and Section 07 92 00 – Joint Sealants, required to comply with requirements of the Contract Documents, or otherwise ensure air and watertight construction and assembly.

B. All components of the air barrier system, including but not limited to, primers, membrane, and flashings shall be the products of a single manufacturer to provide a fully compatible system complying with requirements of the Massachusetts Energy Code. Strictly comply with the approved air barrier membrane manufacturer's printed instructions and the following:

1. Apply materials within the approved manufacturer's requirements for temperature and weather conditions. Apply air barrier overcast-in-place concrete, concrete block and silicone treated sheathing materials utilizing spray or trowel application. Membrane cured film thickness shall provide a fully compatible system complying with requirements of the Massachusetts Energy Code. Swipe or trowel marks of the membrane are acceptable as the minimum thickness is maintained. Membrane thickness control on both vertical or horizontal applications shall be achieved by marking an area and spot checking the thickness with a wet film thickness gauge. Surface gaps shall be filled with the approved air barrier manufacturer's required sealant, troweled smooth and flush, and allowed to cure, prior to application of the air barrier membrane.
2. Air barrier membrane shall be spray applied to all wall surfaces and allowed to cure. Install detail strips on beams, columns, changes in substrate material, and similar joints or connections. Detail strips shall be lapped from exterior wall surface to the sill, jamb, and head of all doors, window, and louver openings, and other wall penetrations to provide a minimum of 3 inches of wall contact and 1 inch pass the interior face of doors, windows, louvers, and all other fixed objects penetrating air barrier membrane. Detail strips are required at all changes in plane.
3. Air barrier components shall not be applied to wet or frozen substrates.
4. Seal air barrier components completely at all edges, perimeters, and penetrations.
5. Apply a scratch coat prior to the full application of the air barrier membrane if substrate is damp or if concrete mortar is "green" and the area to be coated is in direct sunlight with the temperature rising.

6. Provide the approved air barrier manufacturer's required sealant for all silicone treated sheathing joints, brick veneer anchors, and insulation fasteners necessary to establish and maintain a continuous air barrier system.

C. Protect installed Work from damage due to harmful weather exposures, physical abuse, and other causes.

D. Provide temporary protection over air barrier membrane to prevent contamination with dust or dirt if finish materials shall not be installed within the approved manufacturer's recommended time limit for exposure.

E. Repair damage to air barrier membrane caused by construction activities or subsequent Work prior to covering.

3.04 CONNECTION OF AIR BARRIER MEMBRANE AT ROOF ASSEMBLIES

A. The Work of this Section shall be connected and sealed to roof air barrier membranes as indicated on the Drawings, with all seams and penetrations taped and sealed in accordance with the approved manufacturer's written instructions, or as otherwise required to comply with requirements of the Contract Documents.

3.05 CLEANING AND PROTECTION

A. Remove any masking materials after installation. Clean any stains on materials which would be exposed in the completed Work.

B. Protect completed membrane waterproofing from weather and water sources on the negative or back side and subsequent construction activities as recommended by manufacturer.

3.06 RUBBISH REMOVAL

A. The Subcontractor of this Section shall stockpile and drop daily of all wastes and debris at areas designated by the General Contractor.

B. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION

SECTION 07 31 13

ASPHALT SHINGLES

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK

A. The Work of this Section shall include, but not be limited to, furnishing and installation of the following:
   1. Granule surfaced asphalt shingle roofing.
   2. Moisture shedding underlayment, eaves, valley, and ridge protection
   3. Associated metal flashing.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
   2. Section 02 41 13 - Selective Demolition
   3. Section 03 54 13 - Cementitious Underlayment
   4. Section 04 20 00 – Unit Masonry
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
   7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
   8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
   9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
   10. DIVISION 09 – FINISHES; including all Sections contained therein.
   11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
   12. Section 14 24 00 – Hydraulic Elevator
   13. Section 21 00 00 – Fire Suppression
   14. Section 22 00 00 – Plumbing
   15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
   16. Section 26 00 00 – Electrical
   17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
   18. Section 28 10 00 – Fire Alarm
   19. Section 31 20 00 – Earth Moving

1.04 REFERENCES

A. ASTM A 653/A 653M – Standard Specification for Steel Sheets, Zinc-Coated (Galvanized) or Zinc-Iron-Alloy-Coated (Galvannealed) by the Hot-Dip Process

B. ASTM B 209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

C. ASTM B 370 – Standard Specification for Copper Sheet and Strip for Building Construction.

D. ASTM D 225 – Standard Specification for Asphalt Shingles (Organic Felt) Surfaced with Mineral Granules.

E. ASTM D 226 – Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.

F. ASTM D 1970 – Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials used as Steep Roofing Underlayment for Ice Dam Protection.

G. ASTM D 3018 – Standard Specification for Class A Shingles Surfaced with Mineral Granules.

H. ASTM D 3161 – Standard Test Method for Wind Resistance of Asphalt Shingles (Fan-Induced Method).

I. ASTM D 3462 – Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules.

J. ASTM D 4586 – Standard Specification for Asphalt Roof Cement, Asbestos-Free.

K. ASTM D-4869 – Standard Specification for Asphalt-Saturated Organic Felt Shingle Underlayment Used in Roofing.

L. ASTM D 6757 – Standard Specification for Inorganic Underlayment for Use with Steep Slope Roofing Products.

M. ASTM D7158 – Standard Test Method for Wind Resistance of Asphalt Shingles (Uplift Force/Uplift Resistance Method)

N. ASTM E 108 – Standard Test Methods for Fire Test of Roof Coverings

O. ASTM G 21 – Determining Resistance of Synthetic Polymers to Fungi

1.05 SUBMITTALS

A. Submit under provisions of Section 01 30 00.

B. Product Data: Provide manufacturer's printed product information indicating material characteristics, performance criteria and product limitations.

C. Manufacturer's Installation Instructions: Provide published instructions that indicate preparation required and installation procedures.

D. Certificate of Compliance: Provide Certificate of Compliance from an independent laboratory indicating that the asphalt fiberglass shingles made in normal production meet or exceed the requirements of the following:

1. ASTM E 108/UL 790 Class A Fire Resistance
2. ASTM D 3161/D 7158/UL 997 Wind Resistance.
3. ASTM D 3462

E. Shop Drawings: Indicate specially configured metal flashing, jointing methods and locations, fastening methods and locations and installation details as required by project conditions indicated.

1.06 QUALITY ASSURANCE

A. Installer Minimum Qualifications: Installer shall be licensed or otherwise authorized by all federal, state and local authorities to install all products specified in this section. Installer shall perform work in accordance with NRCA Roofing and Waterproofing Manual. Work shall be acceptable to the asphalt shingle manufacturer.

B. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Finish areas designated by architect
   2. Do not proceed with remaining work until workmanship, color and pattern are approved by Architect.
   3. Rework Mock-Up area as required to produce acceptable work.

C. Pre-Installation Meeting – Conduct a pre-installation meeting at the site prior to commencing work of this section: Require attendance of entities directly concerned with roof installation. Agenda will include:
   1. Installation methods and manufacturer's requirements and recommendations
   2. Safety procedures
   3. Coordination with installation of other work
   4. Availability of roofing materials.
   5. Extra Material – Furnish under provision of section 01 70 00
   6. Provide _____ square feet (____ square m) of extra shingles of each color specified.
   7. Preparation and approval of substrate and penetrations through roof.
   8. Other items related to successful execution of work.
   9. Product Compliance – Verify that products conform with all requirements specified by local Authority Having Jurisdiction (AHJ).

D. Maintain one copy of manufacturer's application instructions on the project site..

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store Products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials and materials used with solvent based materials in accordance with requirements of Authorities Having Jurisdiction.

C. Deliver shingles to site in manufacturer's unopened labeled bundles. Promptly verify quantities and conditions. Immediately remove damaged products from site.

1.08 PROJECT ENVIRONMENTAL CONDITIONS

A. Anticipate and observe environmental conditions (temperature, humidity and moisture) within limits recommended by manufacturer for optimum results. Do not install products under environment conditions outside manufacturer's limits.

B. Take special care when applying WinterGuard Waterproofing Shingle Underlayment and shingles when ambient or wind chill temperature is below 45 degrees F (7 degrees C). Tack WinterGuard in place if it does not adhere immediately to the deck

1.09 WARRANTY

A. Manufacturer's Warranty: Furnish shingle manufacturer's warranty for the product listed below:

B. SureStart PLUS Extended Warranty Protection (can only be provided by a CertainTeed Credentialed Contractor): Landmark AR shingles carry:

1. 5-Star Coverage (50 years) material and labor costs for repair or replacement, tear off and disposal costs, and workmanship defects (25 years).

C. Warranty Transferability Clause: Make available to Owner shingle manufacturer's standard option for transferring warranty to a new owner.

D. Refer to manufacturer's warranty for adjustments for commercial applications.

E. Provide Upgraded Wind Warranty from 110 to 130 mph on L AR shingles for first 15 years by complying with all manufacturers' conditions and instructions (see section 2.2-B below).

1.10 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner's Project Manager, Architect, and related subcontractors.

PART 2 - PRODUCTS

2.01 ASPHALT FIBERGLASS SHINGLES

A. Provide Type I, Self-Sealing, UL Certification of ASTM D 3462, ASTM D 3161/UL997 110-mph Wind Resistance and UL Class A Fire Resistance, glass fiber mat base, ceramically colored/UV resistant mineral surface granules across entire face of shingle; algae-resistance; two piece laminate shingle,.Landmark AR as manufacturred by CerainTeed or equal.

B. Wind warranty upgrade to resist blow-off due to wind velocities, including gusts, up to a maximum of 130 miles per hour during the first fifteen (15) years, provided all of the following conditions are met:

1. Shingles are not applied over existing roof shingles (roof-overs are not permitted).
2. Corresponding hip and ridge accessory products are installed as cap shingles.
3. Corresponding starter shingles are installed along the roof eaves and rakes.
4. Weight: 229 / 240 pounds per square (dependent on manufacturing location) (100 square feet).
5. Color: As selected by Architect from manufacturer's standards

2.02 SHEET MATERIALS

A. Eaves Protection: CertainTeed "WinterGuard"; ASTM D1970 sheet barrier of self-adhering rubberized asphalt membrane shingle underlayment having internal reinforcement and "split" back plastic release film; provide material warranty equal in duration to that of shingles being applied.

B. Underlayment: CertainTeed "Roofers' Select", ASTM D 6757; asphalt-impregnated fiberglass-reinforced organic felt designed for use on roof decks as a water-resistant layer beneath roofing shingles.

2.03 FLASHING MATERIALS

A. Sheet Flashing: ASTM A 361/A361M; 26 Gauge (0.45 mm) steel with minimum G115/Z350 galvanized coating

B. Sheet Flashing: ASTM B 209; 0.025 (0.63mm) thick aluminum, mill finish.

C. Sheet Flashing: ASTM B 370; cold rolled copper; 16 ounces per square foot (0.55mm), natural finish.

D. Bituminous Paint: Acid and alkali resistant type; black color.

E. Tinner's Paint: Color as selected by Architect to coordinate with shingle color.

2.04 ACCESSORIES

A. Nails: Standard round wire type roofing nails, corrosion resistant; hot dipped zinc coated steel, aluminum or chromated steel; minimum 3.8 inch (9.5mm) head diameter; minimum 11 or 12 gage (2.5mm) shank diameter; shank to be sufficient length to penetrate through the roof sheathing or ¾ inch (19mm) into solid wood, plywood or non-veneer wood decking.

B. Asphalt Roofing Cement: ASTM D 4586, Type I or II

2.05 FLASHING FABRICATION

A. Form flashing to profiles indicated on Drawings and to protect roofing materials from physical damage and shed water.

B. Form sections square and accurate to profile, in maximum possible lengths, free from distortion or defects detrimental to appearance or performance.

2.06 ATTIC VENTILATION

A. CertainTeed Rolled Ridge Vent (28 lf) Filtered or Unfiltered
   1. Shingle over low profile ridge vent designed with external baffle to deflect wind and weather over the vent. The external baffle creates low pressure over the vent openings to "pull" air from the attic.
   2. Internal weather filter helps protect the attic from wind driven rain, snow, dust and insects.
   3. Each vent will provide 12 sq inches of net free area per lineal foot.
   4. Accommodates roof pitches of 3/12 to 20/12.
   5. The vent carries an approval report with the Texas Department of Insurance

6. Limited Lifetime Warranty and 5-year Sure Start Protection.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing site conditions under provisions of Section 01 70 00.

B. Verify that roof penetrations and plumbing stacks are in place and flashed to deck surfaces.

C. Verify deck surfaces are dry and free of ridges, warps or voids.

3.02 ROOF DECK PREPARATION

A. Follow shingle manufacturer's recommendations for acceptable roof deck material.

B. Broom clean deck surfaces under eave protection and underlayment prior to their application.

3.03 INSTALLATION – EAVE ICE DAM PROTECTION

A. Place eave edge and gable metal edge flashing tight with fascia boards. Weather-lap joints 2 inches (50mm). Secure flange with nails spaced 8 inches (200 mm) on center.

B. Apply CertainTeed "WinterGuard" Waterproofing Shingle Underlayment as eave protection in accordance with manufacturer's instructions.

C. Extend eave protection membrane minimum 24 inches (640 mm) up slope beyond interior face of exterior wall.

3.04 INSTALLATION – PROTECTIVE UNDERLAYMENT

A. Roof Slopes between 2:12 and 4:12: Apply one layer of "WinterGuard" over all areas not protected by WinterGuard at eaves, with end and edges weather lapped minimum of 19 inches (480 mm) Stagger end laps each consecutive layer. Nail in place

B. Roof Slopes between 2:12 and 4:12: Apply two layers of Roofer's Select or D4869 underlayment over areas not protected my WinterGuard at eaves, with ends and edges weather-lapped 19 inches (480 mm) .Stagger end laps each consecutive layer. Nail in place.

C. Roof Slopes between 2:12 and 4:12 – Use of Diamond Deck Synthetic Roofing Underlayment. Follow manufacturer's printed instructions for low slope application of this product. Do not use staples on this product.

D. Roof Slopes 4:12 or Greater: Install one layer of asphalt felt shingle underlayment perpendicular to slope of roof and lap minimum 4 inches (100 mm) over eave protection.

E. Weather-lap and seal watertight with asphalt roofing cement items projecting through or mounted on roof. Avoid contact or solvent-based cements with WinterGuard and Diamond Deck.

3.05 INSTALLATION – VALLEY PROTECTION

A. For "closed-cut," "woven," and "open" valleys, first place one ply of WinterGuard, minimum 36 inches (910 mm) wide, centered over valleys. Lap joints minimum of 6 inches (152 mm) Follow instructions of shingle and waterproofing membrane manufacturer.

3.06 INSTALLATON – METAL FLASHING

A. Weather-lap joints minimum 2 inches (50 mm).

B. Seal work projecting through or mounted on roof with asphalt roofing cement and make weather tight.

3.07 INSTALLATION – ASPHALT SHINGLES

A. Install shingles in accordance with manufacturer's instructions for product type and application specified.

3.08 FIELD QUALITY CONTROL

A. Visual inspection of the work will be provided by Owner. If conditions are unacceptable, Owner will notify the Architect.

3.09 PROTECTION OF FINISHED WORK

A. Do not permit traffic over finished roof surface.

3.10 RUBBISH REMOVAL

A. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 50 00 – Temporary Facilities and Controls.

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SECTION 07 53 23

EPDM MEMBRANE ROOFING

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK

A. The Work of this Section shall include, but not be limited to, furnishing and installation of the following:
   1. Adhered EPDM membrane roofing system.
   2. Cover board.
   3. Roof insulation.
   4. Vapor retarder.
   5. Base Sheet.
   6. Substrate board.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
   2. Section 02 41 13 - Selective Demolition
   3. Section 03 54 13 - Cementitious Underlayment
   4. Section 04 20 00 – Unit Masonry
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
   7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
   8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
   9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
   10. DIVISION 09 – FINISHES; including all Sections contained therein.
   11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
   12. Section 14 24 00 – Hydraulic Elevator
   13. Section 21 00 00 – Fire Suppression
   14. Section 22 00 00 – Plumbing
   15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
   16. Section 26 00 00 – Electrical
   17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.

18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.04 REFERENCES

A. Roofing Terminology: Refer to the following publications for definitions of roofing work related terms used in this Section:
   1. ASTM D 1079 "Standard Terminology Relating to Roofing and Waterproofing."
   2. Glossary of NRCA's "The NRCA Roofing and Waterproofing Manual."
   3. Roof Consultants Institute "Glossary of Roofing Terms."

B. Sheet Metal Terminology and Techniques: SMACNA "Architectural Sheet Metal Manual."

1.05 DESIGN CRITERIA

A. General: Installed roofing membrane systems shall remain watertight; and resist specified wind uplift pressures, thermally induced movement, and exposure to weather without failure.

B. Material Compatibility: Roofing materials shall be compatible with one another under conditions of service and application required, as demonstrated by roofing system manufacturer based on testing and field experience.

C. Installer shall comply with current code requirements based on authority having jurisdiction.

D. Wind Uplift Performance: Roofing system shall meet the intent of systems that have been successfully tested by a qualified testing and inspecting agency to resist wind uplift pressure calculated in accordance with ASCE 7.

E. Fire-Test-Response Characteristics: Provide roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.

F. Exterior Fire-Test Exposure: Class A; UL 790, for application and roof slopes indicated.

1.06 SUBMITTALS

A. Product Data: Manufacturer's data sheets for each product to be provided.

B. Detail Drawings: Provide roofing system plans, elevations, sections, details, and details of attachment to other Work, including:
   1. Base flashings, cants, and membrane terminations.
   2. Tapered insulation, including slopes.
   3. Crickets, saddles, and tapered edge strips, including slopes.
   4. Insulation fastening patterns.

G. Verification Samples: Provide for each product specified.

C. Installer Certificates: confirmation that installer is approved, authorized, or licensed by manufacture to install roofing system.

D. Maintenance Data: Refer to Johns Manville's latest published documents on www.JM.com.

E. Guarantees: Provide manufacturer's current guarantee specimen.

F. Roofing sub-contractor shall provide a copy of the final System Assembly Letter issued by Johns Manville Roofing Systems indicating that the products and system to be installed shall be eligible to receive the specified manufacturer's guarantee when installed by a certified JM contractor in accordance with our application requirements, inspected and approved by a JM Technical Representative.

G. Prior to roofing system installation, roofing sub-contractor shall provide a copy of the Guarantee Application Confirmation document issued by Johns Manville Roofing Systems indicating that the project has been reviewed for eligibility to receive the specified guarantee and registered.

1.07 QUALITY ASSURANCE

A. Installer Qualifications: Qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product who is eligible to receive the specified manufacturer's guarantee.

B. Manufacturer Qualifications: Qualified domestic U.S. owned and based manufacturer that has [UL listing] or accredited testing agency listing for roofing system identical to that used for this Project.

C. Testing Agency Qualifications: Independent testing agency with the experience and capability to conduct the testing indicated, as documented in accordance with ASTM E329.

D. Test Reports:

1. Roof drain and leader test or submit plumber’s verification.
2. Core cut, if requested.
3. Roof deck fastener pullout test, if required
4. Bonded pull test, if required.

E. Moisture Survey, if required:

1. Submit prior to installation, results of a non-destructive moisture test of roof system completed by approved third party. Utilize one of the approved methods:
    a. Infrared Thermography
    b. Nuclear Backscatter

F. Source Limitations: Obtain all components from the single source roofing system manufacturer guaranteeing the roofing system. All products used in the system shall be labeled by the single source roofing system manufacturer issuing the guarantee.

G. Fire-Test-Response Characteristics: Roofing materials shall comply with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storage.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.09 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when current and forecasted weather conditions permit roofing system to be installed in accordance with manufacturer's written instructions and guarantee requirements.

1.10 GUARANTEES

A. Provide manufacturer's system guarantee equal to Johns Manville's Peak Advantage No Dollar Limit Roofing System Guarantee.

1. Single-source special guarantee includes roofing membrane, base flashings, roofing membrane accessories, roof insulation, fasteners, adhesives, cover board, substrate board, vapor retarder, walkway products, manufacturer’s expansion joints, manufacturer’s edge metal products, and other approved single-source components of roofing system marketed by the manufacturer.
2. Guarantee Period: 20 years from date of Substantial Completion.
3. Contractor is required to list “INSERT FIRM NAME” as the Specifier/Consultant of record in the appropriate fields (“Specifier Account”) when applying for the manufacturer’s warranty.

B. Installer’s Guarantee: Submit roofing Installer's guarantee, including all components of roofing system for the following guarantee period:

1. Guarantee Period: Five years from date of Substantial Completion.

C. Existing Guarantees: Guarantees on existing building elements should not be affected by scope of work.

1. Installer is responsible for coordinating with building owner’s representative to verify compliance.

1.11 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner’s Project Manager, Architect, and related subcontractors.

PART 2 - PRODUCTS

2.01 ETHYLENE PROPYLENE DIENE MONOMER ROOFING MEMBRANE (EPDM)

A. Provide Non-reinforced uniform, flexible sheet, ASTM D 4637, Type I, JM EPDM NR as manufactured by John's Mansville or equal. The EPDM shall comply with the following properties:

1. Thickness (minimum): 90 mils
2. Exposed Face Color: Black.
3. Factory Inseam Tape: 6-inch wide minimum

2.02 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.

1. Liquid-type auxiliary materials shall meet VOC limits of authorities having jurisdiction.

B. Sheet Flashing: Manufacturer's internally reinforced or scrim reinforced. JM EPDM Peel & Stick Flashing

C. Primer Material: Manufacturer's standard synthetic-rubber polymer primer. JM EPDM Tape Primer Plus

D. Liquid Applied Flashing: Manufacturer's single ply liquid and fabric reinforced flashing system created with a fleece polyester scrim and a two-component polyurethane based liquid applied flashing material, consisting of a liquid resin and a curing agent. Basis of design: JM SP Liquid Flashing Resin and JM SP Liquid Flashing Scrim

E. Liquid Applied Flashing Primer: Manufacturer's single ply liquid flashing primer. Basis of design: JM Single Ply Membrane Primer (Low VOC), JM SP Liquid Flashing Concrete Primer, or JM SP Liquid Flashing Metal and Wood Primer, JM EPDM Taper Primer Plus or JM EPDM Taper Primer Plus (Low VOC)

F. Seaming Material: Manufacturer's standard 6-inch wide minimum, butyl splice tape with release film. Basis of design: JM EPDM Seam Tape Plus

G. Sealing Strip: Manufacturer's standard 6-inch wide, 45 mil (1.14 mm) thick minimum, cured EPDM with factory-laminated, self-adhering seam tape. JM EPDM Peel & Stick Sealing Strip

H. Bonding Adhesive: Manufacturer's standard solvent based bonding adhesive for membrane. JM All Season Sprayable Bonding Adhesive

I. Serviceable Installation Ambient Air Temperature: 25°F and rising

J. Flashing Adhesive: Manufacturer's standard solvent based bonding adhesive for base flashings. JM Membrane Bonding Adhesive.

K. Serviceable Installation Ambient Air Temperature: 25°F and rising

L. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

M. Protection Mat: Nominal 7.0 oz/yd2 (237.34 g/m2) needle-punched UV-resistant polypropylene fabric. Basis of design: JM EPDM Protective Stone Mat.

N. Metal Termination Bars: Manufacturer's standard predrilled stainless-steel or aluminum bars, with anchors. Basis of design: JM Termination Systems

O. Membrane Battens: Manufacturer's standard polymer or aluminum-zinc-alloy-coated steel sheet, pre-punched. Basis of design: Membrane Battens

P. Fasteners: Factory-coated steel fasteners and metal plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer. High Load Fasteners and Plates.

Q. Miscellaneous Accessories: Provide all accessories to meet the roofing manufacturer's guarantee requirements.

2.03 REFLECTIVE COATING

A. Elastomeric Coating: ASTM D 6083. A multipurpose, acrylic elastomeric coating for use over a variety of substrates. TopGard 4000

B. Base Coat: One-part acrylic elastomeric with bleed-blocking properties for coating over asphalt surfaces. Basis of design: TopGard Base Coat.

2.04 WALKWAYS

A. Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads sourced from membrane roofing system manufacturer. JM EPDM Peel & Stick Walkpads.

2.05 COVER BOARD

A. Polyisocyanurate Board: ASTM C 1289, Type II, Class 1, Grade 2 (20 psi), polyisocyanurate bonded in-line to fiber glass reinforced. SeparatoR.

2.06 ROOF INSULATION – FLUTE FILLER

A. General: Preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.

A. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, Product: ENRGY 3

B. Provide metal roof flute filler insulation package with thickness to fill flutes the height of the standing seam.

2.07 ROOF INSULATION

A. General: Preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.

B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2 (20 psi), ENRGY 3.

C. Provide insulation package with minimum required by applicable code.

D. Provide insulation package with minimum thickness.

E. Provide insulation package in multiple layers.

F. Minimum Long-Term Thermal Resistance (LTTR): 5.7 per inch.

G. Determined in accordance with CAN/ULC S770 at 75ºF (24ºC)

2.08 TAPERED INSULATION

A. Tapered Insulation: ASTM C 1289, Type II, Class 1, Grade 2 (20 psi), provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48), unless otherwise indicated. Tapered ENRGY 3.

2.09 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.

B. Provide saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated. Basis of design: Tapered Fesco Edge Strip

C. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof insulation to substrate, and furnished by roofing system manufacturer. Basis of design: [UltraFast Fasteners and UltraFast Plates] [All Purpose Fasteners and High Load Plates], [All Purpose Fasteners and UltraFast Plates], [Lite-Deck Fasteners and Plates]

D. Urethane Adhesive: Manufacturer's two component polyurethane adhesive formulated to adhere insulation to substrate. Basis of design: [JM Two-Part Urethane Insulation Adhesive (UIA)] [JM One-Step Foamable Adhesive] [Roofing Systems Urethane Adhesive (RSUA)] [JM Two-Part Urethane Insulation Adhesive Canister]

E. Wood Nailer Strips: Comply with requirements in Division 06 Section "Miscellaneous Rough Carpentry."

2.10 VAPOR RETARDER

A. Glass-Fiber Felts: ASTM D 2178, Type IV, asphalt-impregnated, glass-fiber felt. GlasPly IV.

B. Torch Applied SBS Vapor Retarder: ASTM D 6163, Grade S, Type I, glass-fiber-reinforced.

C. Self-Adhered SBS Vapor Retarder: ASTM D 6163, Grade S, Type I, glass-fiber-reinforced, SBS-modified asphalt sheet; sand surfaced; suitable for application method specified. DynaGrip Base SD/SA.

D. Asphalt Primer: ASTM D 41. JM Asphalt Primer

E. Self-Adhered SBS Vapor Retarder: Tri-laminate woven polyethylene, nonslip UV protected top surface; suitable for application method specified. JM Vapor Barrier SAR.

F. Self-Adhered Primer: One-part penetrating primer solution to enhance the adhesion of self-adhering membranes. SA Primer.

G. Polyethylene Air Barrier: ASTM D 4397, 6 mils (0.15 mm) thick, minimum, with maximum permeance rating of 0.13 perm (7.5 ng/Pa x s x sq. m).

2.11 BASE-SHEET MATERIALS

A. Base Sheet: ASTM D 4601, Type II non-perforated, asphalt-impregnated and -coated, glass-fiber sheet, dusted with fine mineral surfacing on both sides. PermaPly 28

B. Base-Sheet Fasteners: Factory-coated steel fasteners and Galvalume metal plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening base-sheet to substrate, tested by manufacturer for required pullout strength, and provided by the roofing system manufacturer. Product: Lightweight Concrete (LWC) Base Sheet Fasteners

2.12 SUBSTRATE BOARD

A. Gypsum Board: ASTM C 1177, coated glass-mat facer, water-resistant gypsum substrate for mechanically attached roof applications, 1/4 inch (6 mm) thick. Securock Ultralight Glass-Mat Roof Board.

B. Thickness: 1/2 inch (13 mm)

C. R-value: 2.5

2.13 EDGE METAL COMPONENTS

A. Expansion Joints: Provide factory fabricated weatherproof, exterior covers for expansion joint openings consisting of flexible rubber membrane, supported by a closed cell foam to form flexible bellows, with two metal flanges, adhesively and mechanically combined to the bellows by a bifurcation process. Provide product manufactured and marketed by single-source membrane supplier that is included in the No Dollar Limit guarantee. Expand-O-Flash.

B. Coping System: Manufacturer's factory fabricated coping consisting of a base piece and a snap-on cap. Provide product manufactured and marketed by single-source membrane supplier that is included in the No Dollar Limit guarantee. Presto-Lock Coping.

C. Fascia System: Manufacturer's factory fabricated fascia consisting of a base piece and a snap-on cover. Provide product manufactured and marketed by single-source membrane supplier that is included in the No Dollar Limit guarantee. Presto-Tite Fascia (Single Ply Systems).

D. Metal/Membrane Flashing: Specially designed and manufactured flashing for sealing and waterproofing. JM EPDM Metal/Membrane Flashing

PART 3 - EXECUTION

3.01 EXAMINATION

A. General:

1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
2. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.

B. Steel Decks:
   1. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Division 05 Section "Steel Decking."
   2. Verify that decking is visibly dry and free of moisture.
   3. Verify that the decking is smooth and free of large cracks, holes or sharp changes in elevation of the surface.
   4. When applicable perform pull test with the specific fastener being used on the project to confirm the fastener resistance meets the requirements for that particular system.

C. Concrete Decks:
   1. Verify that concrete curing compounds that will impair adhesion of roofing components to roof deck have been removed.
   2. Verify that concrete substrate is visibly dry and free of moisture.

D. Wood Decks:
   1. Verify that wood decking is visibly dry and free of moisture.
   2. Verify that wood has ability to provide minimum fastener pull-out resistance.
   3. Cementitious Wood Fiber Decks (Tectum):
   4. Verify that cementitious wood fiber substrate is visibly dry and free of moisture.
   5. Verify that cementitious wood fiber has ability to provide minimum base sheet fastener pull-out resistance.

E. Lightweight insulating Concrete:
   1. Verify that lightweight insulating concrete substrate is visibly dry and free of moisture.
   2. Verify that lightweight insulating concrete has ability to provide minimum base sheet fastener pull-out resistance.
   3. Provide documentation of adhesion resistance values in accordance with ANSI/SPRI 1A-1 2015.

F. Gypsum Deck:
   1. Verify that gypsum is visibly dry, free of moisture, and that there are no signs of staining.
   2. Inspect deck for cracking and deflection of bulb tees.
   3. Verify that gypsum has ability to provide minimum fastener pull-out resistance.
   4. Ensure general rigidity and proper slope for drainage.
   5. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units more than 1/16 inch (1.6 mm) out of plane relative to adjoining deck.
   6. Unacceptable panels should be brought to the attention of the General Contractor and Project Owner’s Representative and shall be corrected prior to installation of roofing system.

3.02 PREPARATION

A. Clean and remove from substrate sharp projections, dust, debris, moisture, and other substances detrimental to roofing installation in accordance with roofing system manufacturer's written instructions.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction.

C. If applicable, prime surface of deck with primer at a rate recommended by roofing manufacturer and allow primer to dry.

D. Proceed with each step of installation only after unsatisfactory conditions have been corrected.

3.03 RE-ROOF PREPARATION

A. Remove all roofing membrane, surfacing, coverboards, insulation, fasteners, asphalt, pitch, adhesives, etc.

B. Remove an area no larger than can be re-roofed in one day.

C. Tear out all base flashings, counterflashings, pitch pans, pipe flashings, vents, sumps and like components necessary for application of new membrane.

D. Remove abandoned equipment curbs, skylights, smoke hatches, and penetrations.

E. Install decking to match existing as directed by Owner's Representative.

F. Raise (disconnect by licensed craftsmen, if necessary) all HVAC units and other equipment supported by curbs to conform with the following:

G. Modify curbs as required to provide a minimum 8" base flashing height measured from the surface of the new membrane to the top of the flashing membrane.

H. Secure of flashing and install new metal counterflashing prior to re-installation of unit.

I. Perimeter nailers shall be elevated to match elevation of new roof insulation.

J. Immediately remove all debris from roof surface. Demolished roof system may not be stored on the roof surface.

3.04 RE-COVER PREPARATION

A. Prepare existing roof according to roofing system manufacturer's written instructions, applicable recommendations of the roofing manufacturer, and requirements in this Section.

B. Tear out all base flashings, counterflashings, pitch pans, pipe flashings, vents, sumps and like components necessary for application of new membrane.

C. Disable existing roof membrane per manufacturer’s written instruction.

D. Remove existing membrane per manufacturer’s written instructions.

E. Remove and replace wet, deteriorated or damaged roof insulation and decking as identified in moisture survey.

F. Remove abandoned equipment curbs, skylights, smoke hatches, and penetrations. Install decking to match existing as directed by Owner's Representative.

G. Raise, (disconnect by licensed craftsmen, if necessary) all HVAC units and other equipment supported by curbs to conform with the following:

H. Modify curbs as required to provide a minimum 8-inch base flashing height measured from the surface of the new membrane to the top of the flashing membrane.

I. Secure top of flashing and install new metal counterflashing prior to re-installation of unit.

J. Perimeter nailers shall be elevated to match elevation of new roof insulation.

K. Immediately remove all debris from roof surface. Demolished roof system may not be stored on the roof surface.

L. Install polyester slip sheet as a loosely laid single layer beneath new single ply membrane, side and end lapping each sheet a minimum of 3 inches (76.2 mm) and 6 inches (150 mm), respectively. Sheet may be tacked into place as deemed necessary.

3.05 SUBSTRATE BOARD INSTALLATION

A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.

B. Fasten substrate board to [top flanges of steel deck] [wood deck] to resist uplift pressure at corners, perimeter, and field of roof per roofing system manufacturer's written instructions

3.06 BASE-SHEET INSTALLATION

A. Install one lapped base sheet course and mechanically fasten to substrate per roofing system manufacturer's written instructions.

B. Enhance fastening rate in perimeter and corner zones per code requirements, wind uplift system approvals or manufacturer’s guarantee requirements, whichever is more stringent.

C. Comply with roofing system manufacturer's written instructions for installing roof insulation.

3.07 VAPOR-RETARDER INSTALLATION

A. Install polyethylene-sheet vapor retarder as a loosely laid single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of 2 inches (50 mm) and 6 inches (150 mm), respectively. Seal side and end laps.

B. Install 2 glass-fiber felt plies lapping each sheet 19 inches (483 mm) over preceding sheet. Embed each sheet in a solid mopping of hot roofing asphalt per manufacturer’s written instructions.

C. Install modified bituminous vapor retarder sheet according to roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing membrane sheets over and terminate beyond cants, installing as follows:

D. Unroll roofing membrane sheets and allow them to relax as required by manufacturer.

E. Torch-apply vapor retarder to substrate according to roofing system manufacturer’s instruction.

F. Adhere vapor retarder in a full mopping of hot asphalt to substrate according to roofing system manufacturer’s instruction.

G. Self-adhere vapor retarder to substrate according to roofing system manufacturer’s instruction.

H. Laps: Accurately align roofing membrane sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Completely bond and seal laps, leaving no voids.

I. Repair tears and voids in laps and lapped seams not completely sealed.

J. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into membrane roofing system.

3.08 FLUTE FILLER INSULATION INSTALLATION

A. Coordinate installation of roof system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with roofing system manufacturer's written instructions for installing roof insulation.

C. Loose lay polyisocyanurate flute filler insulation between the metal roof standing seams.

3.09 INSULATION INSTALLATION

A. Coordinate installation of roof system components so insulation and cover board are not exposed to precipitation or left exposed at the end of the workday.

B. Comply with roofing system manufacturer's written instructions for installation of roof insulation and cover board.

C. Install tapered insulation under area of roofing to conform to slopes indicated.

D. Install insulation boards with long joints in a continuous straight line. Joints should be staggered between rows, abutting edges and ends per manufacturer’s written instructions. Fill gaps exceeding 1/4 inch (6 mm) with like material.

E. Install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.

F. Trim surface of insulation boards where necessary at roof drains so completed surface is flush and does not restrict flow of water.

G. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.

H. Preliminarily Fastened Insulation [for Mechanically Fastened Membrane Systems]: Install insulation with fasteners at rate required by roofing system manufacturer or applicable authority, whichever is more stringent.

I. Fasten top layer to resist uplift pressure at corners, perimeter, and field of roof.

J. Adhered Insulation: Adhere each layer of insulation to substrate as follows:

K. Install each layer in a two-part urethane adhesive according to roofing system manufacturer’s instruction.

L. Install each layer to resist uplift pressure at corners, perimeter, and field of roof.

M. Loose Laid Insulation with Top Insulation Layer Mechanically Fastened: Loose lay insulation with staggered joints and secure top layer of insulation to deck using mechanical fasteners designed and sized for fastening specified board-type to deck type.

N. Fasten top layer to resist uplift pressure at corners, perimeter, and field of roof.

O. Loose Laid Insulation: Loose lay all layers of insulation with staggered joints.

P. Mechanically Fastened with Subsequent Layers Adhered Insulation: Secure first layer of insulation to deck using mechanical fasteners designed and sized for fastening specified board-type to deck type.

Q. Fasten first layer to resist uplift pressure at corners, perimeter, and field of roof.

R. Install subsequent layers in [a two-part urethane adhesive] [hot asphalt] according to roofing system manufacturer's instruction.

S. Install each layer to resist uplift pressure at corners, perimeter, and field of roof.

3.10 COVER BOARD INSTALLATION

A. Coordinate installing membrane roofing system components so cover board is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with membrane roofing system manufacturer's written instructions for installing roof cover board.

C. Install cover board with long joints in a continuous straight line. Joints should be staggered between rows, abutting edges and ends per manufacturer's written instructions. Fill gaps exceeding 1/4 inch (6 mm) with cover board.

D. Cut and fit cover board within 1/4 inch (6 mm) of nailers, projections, and penetrations.

E. Trim surface of cover board where necessary at roof drains so completed surface is flush and does not restrict flow of water.

F. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.

G. Preliminarily Fastened cover board for Mechanically Fastened Systems: Install cover board with fasteners at rate required by roofing system manufacturer or applicable authority, whichever is more stringent.

H. Adhered Cover Board: Adhere cover board to substrate as follows:

I. Install in a two-part urethane adhesive according to roofing system manufacturer's instruction.

J. Install to resist uplift pressure at corners, perimeter, and field of roof.

K. Mechanically Fastened Cover Board: Install cover board and secure to deck using mechanical fasteners designed and sized for fastening specified cover board to deck type.

L. Fasten to resist uplift pressure at corners, perimeter, and field of roof.

M. Loose Laid Cover Board: Loose lay cover board, staggering joints with insulation board substrate.

3.11 ROOFING MEMBRANE INSTALLATION, GENERAL

A. Install roofing membrane in accordance with roofing system manufacturer's written instructions, applicable recommendations of the roofing manufacturer and requirements in this Section.

B. Where roof slope exceeds 1/2 inch per 12 inches (1:24), contact the membrane manufacturer for installation instructions regarding installation direction and backnailing.

C. Cooperate with testing and inspecting agencies engaged or required to perform services for installing roofing system.

D. Coordinate installing roofing system so insulation and other components of the roofing membrane system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is imminent.

E. Provide tie-offs at end of each day's work to cover exposed roofing membrane sheets and insulation.

F. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.

G. Remove and discard temporary seals before beginning work on adjoining roofing.

3.12 ADHERED ROOFING MEMBRANE INSTALLATION

A. Install roofing membrane over area to receive roofing in accordance with membrane roofing system manufacturer's written instructions.

B. Unroll roofing membrane and allow to relax before installing.

C. Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Bonding Adhesive: Apply [solvent-based] [water-based] bonding adhesive to substrate and underside of roofing membrane at rate required by manufacturer and allow to partially dry before installing roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.

E. Mechanically fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing.

F. Apply roofing membrane with side laps shingled with slope of roof deck where possible.

G. Field Fabricated Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing membrane terminations.

H. Tape to Tape Installation: Align membrane for appropriate overlap, remove release liners and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation.

I. Tape to Standard Sheet Installation: Align membrane for appropriate overlap, clean and prime non-taped face of splice area, remove release liners and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation.

J. Spread sealant or mastic bead over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.

3.13 MECHANICALLY FASTENED ROOFING MEMBRANE INSTALLATION

A. Install roofing membrane over area to receive roofing in accordance with roofing system manufacturer's written instructions.

B. Unroll roofing membrane and allow to relax before installing.

C. Install sheet in accordance with roofing system manufacturer's written instructions.

D. Accurately align roofing membranes and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

E. Mechanically fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing.

F. Always install membrane laps perpendicular to the steel deck flutes. "Picture Frame" installation method is not permitted.

G. Apply roofing membrane with side laps shingled with slope of roof deck where possible.

H. Field Fabricated Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing membrane terminations.

I. Tape to Tape Installation: Align membrane for appropriate overlap, remove release liners and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation.

J. Tape to Standard Sheet Installation: Align membrane for appropriate overlap, clean and prime non-taped face of splice area, remove release liners and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation.

K. Tape to Tape Reinforced FIT Installation: Align membrane for appropriate overlap, remove release liners and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation.

L. Align primary sheet with perforated seam tape up.

M. Remove center strip of release liner to expose adhesive tape.

N. Install batten bar over exposed adhesive and fasten to deck through predrilled holes at rate required by manufacturer.

O. Align top sheet over fastened lower sheet as required to expose ¼" of lower tape.

P. Remove three release liners in tandem, then roll seam with hard rubber roller.

Q. Roll across the seam at a 45-degree angle with a hard rubber roller using maximum hand pressure.

R. Spread sealant or mastic bead over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.

S. In-Splice Attachment: Secure one edge of roofing membrane using fastening plates or metal battens centered within membrane splice and mechanically fasten roofing membrane to roof deck. Field-splice seam.

3.14 LOOSELY LAID AND BALLASTED ROOFING MEMBRANE INSTALLATION

A. Install roofing membrane over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roofing membrane and allow to relax before installing.

B. Accurately align roofing membranes, without stretching, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

C. [Mechanically fasten or adhere perimeter of roofing membrane] [Adhere roofing membrane at corners, perimeters, and transitions] according to requirements in ANSI/SPRI RP-4 and according to roofing system manufacturer’s instructions.

D. Apply roofing membrane with side laps shingled with slope of deck where possible.

E. Field Fabricated Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing membrane terminations.

F. Tape to Tape Installation: Align membrane for appropriate overlap, remove release liners and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation.

G. Tape to Standard Sheet Installation: Align membrane for appropriate overlap, clean and prime non-taped face of splice area, remove release liners and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation.

H. Leave seams uncovered until inspected by membrane roofing system manufacturer.

I. [Sealing Strip Installation: Clean and prime both faces of splice areas, apply self-adhering sealing strip, and firmly roll over all seams according to manufacturer's written instructions to ensure a watertight installation. Apply lap sealant and seal exposed edges of membrane roofing terminations.]

J. Repair tears, voids, and lapped seams in roofing that does not meet requirements.

K. Spread sealant or mastic bead over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.

L. Install protection mat over roofing membrane, overlapping a minimum of 6 inches (150 mm). Install an additional protection mat layer at projections, pipes, vents, and drains, overlapping a minimum of 12 inches (300 mm).

M. Aggregate Ballast: Apply aggregate ballast uniformly over roofing membrane at the rate required by membrane roofing system manufacturer, but not less than the following, spreading with care to minimize possibility of damage to membrane roofing system. Lay ballast as roofing membrane is installed, leaving roofing membrane ballasted at the end of the workday.

N. Ballast Weight: Size 4 aggregate, 10 lb/sq. ft. (50 kg/sq. m).

O. Ballast Weight: Size 2 aggregate, 13 lb/sq. ft. (65 kg/sq. m), at corners and perimeter; Size 4 aggregate, 10 lb/sq. ft. (50 kg/sq. m), elsewhere.

P. Roof-Paver Ballast: Install lightweight roof-paver ballast according to manufacturer's written instructions.

Q. Roof-Paver Ballast: Install rubber roof-paver ballast according to manufacturer's written instructions, in locations indicated.

R. Install perimeter paver edge securement.

S. Roof-Paver and Aggregate Ballast: Install heavyweight roof pavers according to manufacturer's written instructions on roof corners and perimeter. Install Size 2 aggregate ballast elsewhere on roofing at a minimum rate of 13 lb/sq. ft. (65 kg/sq. m).

3.15 BASE FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories and adhere to substrates in accordance with membrane roofing system manufacturer's written instructions.

B. Apply solvent-based bonding adhesive at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.

C. Apply two-sided water-based bonding adhesive at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.

D. Apply single ply liquid applied flashing system per manufacturer’s written instructions.

E. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

F. Clean seam areas and overlap and firmly roll sheet flashings into the adhesive.

G. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.16 EDGE METAL INSTALLATION

A. Examine substrates and conditions under which sheet metal flashing and trim are to be installed and verify that Work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Provide edge details as indicated on the Drawings. Install in accordance with the membrane manufacturer's requirements and SMACNA's "Architectural Sheet Metal Manual."

C. Join individual sections in accordance with the membrane manufacturer's requirements and SMACNA's "Architectural Sheet Metal Manual."

3.17 COATING INSTALLATION

A. Ensure that all surfaces are clean, dry and free of any dirt, grease, oil or other debris that may interfere with proper adhesion.

B. Apply coating to roofing membrane and base flashings as recommended by the manufacturer. Apply in two coats allowing the first coat to completely dry before applying the second coat.

3.18 WALKWAY INSTALLATION

A. Flexible Walkways: Install walkway products in locations indicated. Adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

B. Roof-Paver Walkways: Install walkway roof pavers with applicable slip sheet according to manufacturer's written instructions in locations indicated, to form walkways. Leave 3 inches (75 mm) of space between adjacent roof pavers.

3.19 FIELD QUALITY CONTROL

A. Owner or designated representative will provide on-site observation and inspection during installation.

B. Owner will engage a qualified testing agency to perform tests and inspections.

C. Final Roof Inspection: Arrange for roofing system manufacturer's technical representative to inspect roofing installation on completion and submit report to Architect.

D. Repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.20 PROTECTION AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.21 RUBBISH REMOVAL

A. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS
(Part of the Work of Section 07 25 00 – Weather Barriers, Filed Sub-Bid Required)

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 FILED SUB-BID REQUIREMENTS

A. The Work of this Section shall be included as Part of the Work of Section 07 25 00 – Weather Barriers, stipulated as a Filed Sub-Bid under Paragraph D, Item 2 of the Form for General Bid.

B. The Sub-Bidder of Section 07 25 00 – Weather Barriers shall examine all Drawings and all Sections for requirements affecting the Work of this Section as shown primarily in the following drawings:

1. Lincoln Elementary School: A1.01 through A12.01.
2. Thorndyke Road Elementary School: A1.01 and A9.01.

C. The Sub-Bidder of Section 07 25 00 – Weather Barriers shall examine other drawings and specification sections that could affect the Work of this Section as it relates to coordination. The other drawings are the following:

1. Lincoln Elementary School: D1.01 through D7.01; S0.01 through S1.02; FP1.01 through FP1.03; DP1.01 and P1.01; ED.1 through FA.2; DH1.01 and H1.01; VT.01.
2. Thorndyke Road Elementary School: D1.01 through D7.01; S0.01 through S2.01; FP1.01 through FP1.03; DP1.01 through P1.02; ED.0 through FA.3; H1.01 and H1.03; VT.02.

1.03 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:

1. Joint fillers and sealers, including preparation, filling, sealing, and curing of joints at all exterior and interior locations, and dissimilar materials, as described in Part 3 – Execution of this Section.
2. Silicone sealant
3. Expanding foam sealant
4. Protection of completed Work.

1.04 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
2. Section 02 41 13 - Selective Demolition
3. Section 03 54 13 - Cementitious Underlayment
4. Section 04 20 00 – Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.05 QUALITY ASSURANCE

A. The Work of this Section shall be performed by manufacturer approved applicators having a minimum of five (5) years application experience with the required materials.

B. For each type of material required for the Work of this Section, provide primary materials which are the products of one manufacturer. Provide secondary materials which are acceptable to the manufacturers of the primary materials.

C. Make all arrangements and payments necessary to have the approved manufacturer's authorized representative on-site at beginning of waterproofing to advise installer and to ensure compliance with manufacturer's requirements.

D. Provide materials suitable for the intended use and compatible with the materials with which they shall be in contact. Compatibility of sealants and accessories shall be verified in writing by the approved manufacturer.

E. Provide products and materials tested and certified for low emissions of volatile organic compounds (VOC), in accordance with requirements of the Contract Documents. Refer to Section 01 81 13 - Low-Emitting Material Requirements for testing and certification to comply with the following:

1. All adhesives and sealants shall meet the VOC content requirements in the applicable category of South Coast Air Quality Management District (SCAQMD) Rule 1168, Adhesive and Sealant Applications (amended January 2005, or current version).

1.06 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures and in accordance with requirements of the Contract Documents.

B. Submit manufacturer's product data, installation instructions, use limitations and recommendations for each material and system required by the Work this Section.

1. Prior to ordering waterproofing materials, the Waterproofing Subcontractor shall submit the items listed below to the Architect for approval:

a. 3 copies of manufacturer's specifications for proposed products and installation instructions.

b. Written approval of manufacturers use of the products in the proposed system.

c. Specimens copy of membrane manufacturer's warranty.

d. Dimensioned shop drawings indicating areas of Work, membrane layout and profile details of flashing methods for penetrations and terminations. It shall be the manufacturer's responsibility to verify compatibility with surrounding materials, especially at interface with other types of waterproofing.

C. Provide samples as follows:

1. Submit representative samples of each control joint, sealant and expansion joint specified herein, showing the full range of color and finish variations expected. Provide actual samples having a minimum length of 6 inches.

2. Provide samples of each waterproofing material to be used in the systems described herein, including primers, mastics, tapes, liquid waterproofing, termination bars and fasteners, protection, and drainage composite boards.

D. Provide certifications as follows:

1. Provide manufacturer's certification of sealant and joint material performance, including compatibility with adjacent materials to which material shall be applied. Provide certified test reports on aged performances, hardness, stain resistance, adhesion, cohesion and tensile strength, low temperature flexibility, elongation, modules of elasticity, water absorption, and the resistance to weight loss and deterioration due to heat, ozone, and ultraviolet exposure.

1.07 TESTS

A. Submit samples of every material to be used in the Work including, but not limited to, glass, gaskets, glazing materials, framing members, and all other components such as precast concrete, brick, concrete block and other adjoining materials, and accessories, to glazing sealant manufacturer to verify sealant compatibility and to determine, by testing in accordance with requirements of ASTM C794, if primers and what type of primers are required to ensure adhesion to substrates.

1. Submit at least 6 pieces of each type, class, kind, condition, and form of glass including monolithic, laminated, coated, and insulated glass for adhesion testing. Provide 6 pieces of each type of brick, precast concrete, concrete block, and other adjoining materials for adhesion and staining testing.

2. Schedule sufficient time for testing, analysis, and reporting of results, understanding that long lead times are required by the sealant manufacturer.

3. Obtain manufacturer's written report and recommendations regarding proper sealant choice and use. Use sealants and substrates only in combinations for which favorable adhesion and compatibility results have been obtained.
4. Make all arrangements and pay all expenses related to these tests.

B. Periodically test sealants in place for adhesion using methods recommended by sealant manufacturer. Promptly replace all sealant which does not adhere, or which fails to cure properly.

C. If manufacturers cannot or shall not perform these tests, employ at the expense of the Waterproofing Subcontractor an independent testing agency acceptable to the Architect to perform tests and certifications indicated.

1.08 MOCK-UPS

A. Provide Mock-ups before beginning Work of this Section at location acceptable to Architect and obtain Architect's acceptance of visual qualities. Protect and maintain acceptable mock-ups throughout the Work of this Section to serve as criteria for acceptance of this Work. Acceptable mock-ups may be incorporated into the finish Work. Mock-ups shall be as follows:

1. 10 Linear feet of each type of sealant, crack and joint control material specified.

1.09 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products to the job site in original, unopened package, clearly labeled with the manufacturer's identification and printed instructions. All material shall be stored and handled in accordance with the manufacturer’s instructions and recommendations. Protect from damage.

1.10 PROJECT CONDITIONS

A. Perform Work only when ambient conditions are within the limits established by manufacturers of the materials and products used.

B. Proceed with Work related to composite sheet waterproofing only when substrate construction and penetrating Work is complete, and the concrete or mortar has cured for at least 28 days.

C. Provide ventilation in accordance with the approved manufacturer's written requirements and recommendations throughout application and curing for all materials specified in this Section.

1.11 WARRANTY

A. Provide written warranty signed by manufacturer, agreeing to repair or replace Work which exhibits defects in materials or Workmanship. "Defects" shall include, but not be limited to, leakage of water, abnormal aging or deterioration, and failure to perform in accordance with the requirements of the Contract Documents. Include requirement for removal and replacement of covering and connected adjacent Work. Warranty periods shall be as follows:

1. Sealants and Crack Control Materials: 5 years from date of Substantial Completion
2. Waterproofing: 10 years from date of Substantial Completion
3. Exterior sealants: 20 years from date of Substantial Completion

1.12 CUTTING AND CORING

A. The installation of new Work that requires cutting and coring of floors, walls, and roofs with dimensions 5-1/2 in. or less shall be performed by the Subcontractor of this Section. The General Contractor shall cut and core floors, walls, and roofs with dimensions not indicated by the Subcontractor of this Section.

1.13 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner's Project Manager, Architect, and related subcontractors.

B. Advise other trades to ensure that no other Work adversely effects sealer bonding surfaces.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Each sealant shall be checked for adhesion and compatibility with all adjacent materials. Select a sealant that is recommended by the approved manufacturer for the specified application.

B. The color of each sealant shall be selected by the Architect from the approved manufacturer's complete selection of standard and premium colors.

2.02 EXTERIOR SEALANT

A. Provide high-performance, single-component, moisture-cure, ultra-low modulus silicone sealant, Spectrem 1 as manufactured by Tremco or equal by Dow or W.R. Meadows. The sealant shall comply with the following properties:

1. As Supplied:
   a. Curing Time 7 to 14 days
   b. Flow, Sag or Slump Inches Nil, ASTM C639
   c. Full Adhesion 14 to 21 days
   d. Tack Free Time 30 to 60 min., ASTM C679
   e. Tooling Time 10 to 20 min., Skin Formation
   f. Extension +100
2. As Cured, After 14 Days at 77°F (25°C), 50%RH:
   a. Hardness (Shore A) +15, ASTM C661
   b. Peel Strength Aluminum & Glass 30 pli (5.2 kN/m), ASTM C794
   c. Stain & Color Change None, ASTM C510 TT-S-001543A.
   d. Staining of Porous Substrates,
      White Marble Primed & Unprimed ASTM C1248 No Stain
   e. Tear Strength, Die ("C") 40 pli (0.7 kN/m), ASTM D624
   f. Tensile Strength at 100% Elongation 35 psi (0.24 MPa), ASTM C1184
   g. Tensile Strength at Max Elongation 200 psi (1.38 MPa), ASTM D412

2.03 INTERIOR SEALANT

A. Provide single component, acetoxy silicone sealant, Tremsil 200 by Tremco, Inc. or equal by Pecora or Sika. Sealants at all interior joints and similar applications, shall conform to the following requirements:

1. Type S, Grade NS, Class 50, Use NT, G, A and O; in accordance with requirements of ASTM C 920
2. Class A; in accordance with requirements of Federal Specification TT-S-230 and TT-S-001543A
3. Dynamic Movement Capability: +/- 50%; in accordance with requirements of ASTM C 719
4. FDA regulation 21 CFR 177. 2600
5. Shore A hardness of 25-35; in accordance with requirements of ASTM C 661
6. Elongation: 450%; in accordance with requirements of ASTM D 412
7. Tensile Strength @100% Elongation: 45-55 psi; in accordance with requirements of ASTM D 412
8. Ultimate Tensile Strength; 165 psi; in accordance with requirements of ASTM D 412
9. Peel Strength: 25-35 pli; in accordance with requirements of ASTM C 794
10. Recycled Content: 11% Post-Industrial

B. Provide non-sag, acrylic latex sealant, AC-20 + Silicone as manufactured by Pecora or equal by Pecora or Sika. Sealants for general purpose interior caulking to conform with the following requirements:

1. Adhesion Loss (%): 0.5, ASTM C736
2. Elongation, Ultimate (%): 200, ASTM D412
3. Extrudability (g/sec): 9.8, ASTM C731
4. Low-Temperature Flexibility (pass/fail): Pass, ASTM C734
5. 100% Modulus (psi): 60-65, ASTM D412
6. Tensile, Ultimate (psi): 80-90, ASTM D412

2.04 INSULATING FOAM SEALANT

A. Provide polyurethane-based insulating foam sealant, Tite Foam Big Gaps as manufactured by Loctite or equal by Tremco or Sika Emseal. The insulating foam sealant shall seal gap between window, rough opening, metal deck flutes, and stud walls. The insulating foam sealant shall comply with the following characteristics:

1. Color: White
2. Appearance: Foam
3. Specific Gravity: 1.107
4. Flash Point: <20 deg. C
5. VOC Content: 208.6 g/l, SCAQMD Rule #1168
6. Shelf Life: 12 months from date of manufacture

2.05 MISCELLANEOUS MATERIALS

A. Provide appropriate surface primers and accessories for surfaces to be adhered to, in accordance with the approved manufacturer’s written requirements.

B. Provide bond breaker tape No. 40 or No. 531 (heavy duty), as manufactured by Valley Industrial Products, or equal by Decker, in accordance with the approved manufacturer's written requirements, appropriate for the sealant being used.

C. Provide backer rods compatible with the specified sealant, and as follows:
   1. Backer rod for all building joints shall be non-absorbing, with highly resistant interior network of closed and open cells, SOF ROD as manufactured by Applied Extrusion Technologies or equal.
   2. The backer rod for paving and floor joints shall be closed cell polyethylene rod extruded in continuous lengths, GREEN ROD as manufactured by NMC, or equal.

D. Sealant shall be non-drying, non-hardening, non-bleeding, non-staining sealant complying with ASTM C 834 and C 919, USG sealant, or equal by Pecora or Tremco.

PART 3 - EXECUTION

3.01 INSPECTION

A. For each material the installer shall examine substrates, supports, and conditions under which this Work is to be performed and notify General Contractor, in writing, of conditions detrimental to the proper completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected. Beginning Work means Installer accepts substrates and conditions.

B. Strictly comply with the approved manufacturer's written instructions and recommendations, except where more restrictive requirements are specified in this Section.

3.02 JOINT SEALANTS AND FILLERS

A. Clean joint surfaces immediately before installation of sealants, primers, tapes and fillers. Remove all substances which could interfere with bond. Prime, etch, or roughen joint surfaces as necessary to improve bond. Tape or mask adjoining surfaces to prevent spillage and migration problems. Provide backer rods for all liquid sealants except where specifically recommended by sealant manufacturers. Prevent three-sided adhesion by use of bond breaker tapes or backer rods.

B. Force sealant into joints to provide uniform, dense, continuous ribbons free from gaps and air pockets. Install sealants so that compressed sealants do not protrude from joints. Dry tool sealants to form a smooth dense surface with joint surfaces adhering equally on opposite sides. At horizontal joints form a slight cove to prevent trapping water. Except in hot weather, make the sealant surface slightly concave.
   1. Make sealant joint depth equal to joint width for joints up to 1/2 in. wide. For joints over 1/2 in. wide, make depth equal to one-half of the joint width. Joint depth at exterior silicone sealant shall not be greater than 1/2 in.
   2. Fill all joints solidly and continuously with a sealant, neatly applied with a standard caulking gun in a continuous motion, using slight pressure. "Push" the sealant bead ahead of the nozzle; do not "drag" the nozzle.
   3. Within 5 minutes of sealant application and before sealant skins over, dry tool the joint surface with a concave tool to ensure intimate contact with substrate and to eliminate air bubbles. Do not use any liquid for tooling. Provide a smooth, uniform, finished surface.

4. Avoid contaminating adjacent surfaces with excess sealant. Remove all traces of smears and droppings on metal, stone, glass, or other surfaces promptly, using a solvent recommended by the sealant manufacturer and that shall not damage or discolor the building surfaces. Remove smears and droppings on face surfaces by mechanical means after the initial cure of the sealant.
5. Coordinate Work with other trades to prevent contamination of fresh sealant by dust or other debris. Do not seal over any epoxy placements which are not cured.
6. Install internal wall joints to maintain connectivity between vertical and horizontal constructions. Extend internal sealant to the face of wall and as otherwise directed by Architect to compartmentalize waterproofing protection.
7. Install internal sealant materials at sufficient depth (2 1/2 in.+) to maintain 3/4 in. clear unobstructed cavity between the finish face of internal sealant and back of external sealant backing material.
8. Internal joint integrity shall be equal to external joint integrity. Internal seals are primary seals to prevent internal building water intrusion.

C. Seal all interior and exterior joints, seams, intersections between dissimilar materials, unless specifically noted to be performed under the Work of other Sections.
   1. The Work of this Section shall include, but not be limited to, sealing exterior of the building at the following locations:
      a. Building expansion and control joints
      b. Intersections of masonry to dissimilar materials, excluding exterior windows and all aluminum entrances and storefronts, steel door frames, EIFS, and curtainwalls.
      c. Penetrations through exterior masonry veneer
      d. Concrete to concrete at cold joints, cast stones.
      e. Expansion joints in concrete walks
      f. Vertical wall flashing terminations and reglets.
      g. At CMU to gypsum wallboard to concrete, gypsum wallboard to metal deck, countertops, wood to CMU, or gypsum wallboard.
   2. The Work of this Section shall include, but not be limited to, sealing interior of the building at the following locations:
      a. Insulating foam sealant inside metal deck flutes at intersecting joints between top of gypsum drywall and metal decks.
      b. Perimeters of all steel door frames, steel borrow light frames, and other metal frames.
      c. Perimeter of interior windows, aluminum entrances and storefronts, curtainwall frames, and translucent roof assembly frames, skylights, louvers at dissimilar materials
      d. All intersecting joints between gypsum drywall and dissimilar materials
      e. Tile to tile joints inside corners and all joints between tile surfaces and dissimilar materials.
      f. Backsplash to counter joints and backsplash to wall joints at countertops
      g. Completely around all plumbing fixtures, fittings, and trim to countertops, walls, and floors
      h. At the tops of stringers and landings to wall junctures at all stairways.

i. At the perimeters of all backsplashes to wall, ends, and backsplash to counter whether a sink is present or not and all counter to wall areas with no backsplash.

j. At all slab-on-grade construction joints, control joints, and column bases.)

k. Louvers

D. Cure sealants in strict compliance with the approved manufacturers' instructions and recommendations to obtain highest quality surface and maximum adhesion. Make every effort to minimize accelerated aging effects and increase modulus of elasticity.

3.03 REPAIR AND CLEANING

A. Remove and replace Work which is damaged or deteriorated in any respect.

B. Clean adjacent surfaces using materials and methods recommended by system manufacturer. Remove and replace Work that cannot be successfully cleaned.

3.04 RUBBISH REMOVAL

A. The Subcontractor of this Section shall stockpile and drop daily of all wastes and debris at areas designated by the General Contractor.

B. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION

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SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:

1. Interior non-rated and fire rated flush hollow metal doors.
2. Interior metal door and borrowed light frames.
3. Hollow metal frames were provided for wood doors and were required at rated partitions.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
2. Section 02 41 13 - Selective Demolition
3. Section 03 54 13 - Cementitious Underlayment
4. Section 04 20 00 – Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.04 QUALITY ASSURANCE

A. Provide products from one manufacturer for each type of door and frame required for the Work of this Section. Provide secondary materials and products which are acceptable to door and frame manufacturers.

B. Provide doors and frames that comply with Steel Door Institute SDI-100, Recommended Specifications for Standard Steel Doors, and Frames. Install doors in strict compliance with the following as they apply:

1. American Society for Testing and Materials (ASTM):
    a. ASTM-A1008/A1008M-00 - Specification for Commercial Steel (CS) Sheet, Carbon, Cold-Rolled.
    b. ASTM B 117 - Standard Test Method of Salt Spray (Fog) Testing
    c. ASTM E 152 – Standard Method for Fire Tests of Door Assemblies
    d. ASTM E 283 – Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
    e. ASTM A 366 – Standard Specification for Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality.
    f. ASTM-A568/A568M - Specification for Steel, Sheet, Carbon, and High Strength, Low-Alloy, Hot-Rolled, and Cold-Rolled.
    g. ASTM A 653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
    h. ASTM A 924 – Standard Specification for General Requirements for Steel Sheet, Metallic Coated by the Hot-Dip Process
    i. ASTM D 610 – Standard Test Method for Evaluating Degree of Rusting on Painted Steel Surfaces
    j. ASTM D 1735 – Standard Practice for Testing Water Resistance of Coating Using Water Fog Apparatus
2. American National Standards Institute (ANSI):
    a. ANSI/UL 10B Fire Tests of Door Assemblies
    b. ANSI/NFPA 80 Fire Doors and Fire Windows
    c. ANSI/NFPA 252 Fire Tests of Door Assemblies
    d. ANSI A250.3 – Test Procedure and Acceptance Criteria for Factory Applied Finish Painted Steel Surfaces for Steel Doors and Frames
    e. ANSI A250.4 – Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcing
    f. ANSI A250.6 (SDI 107) – Hardware on Standard Steel Doors (Reinforcement-Application)
    g. ANSI A250.7 – Nomenclature for Steel Doors and Steel Door Frames
    h. ANSI A250.8 (SDI-100) – Recommended Specifications for Steel Doors & Frames
    i. ANSI A250.10 – Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames
    j. ANSI/DHI A115 Specifications for Hardware Preparations in Standard Steel Doors and Frames
    k. ANSI/DHI A115.IG Installation Guide for Doors and Frames

3. Steel Door Institute:
    a. SDI 105 – Recommended Erection Instructions for Steel Frames
    b. SDI 106 – Recommended Standard Door Type Nomenclature
    c. SDI 108 – Recommended Selection and Usage Guide for Standard Steel Doors
    d. SDI 109 – Hardware for Standard Steel Doors & Frames
    e. SDI 110 – Standard Steel Doors & Frames for Modular Masonry Construction
    f. SDI 111 – Recommended Standard Details for Steel Doors and Frames
    g. SDI 112 – Zinc-Coated (Galvanized/Galvannealed) Standard Steel Doors & Frames
    h. SDI 122 – Installation and Troubleshooting Guide for Standard Steel Doors & Frames
    i. SDI 124 – Maintenance of Standard Steel Doors & Frames

C. Provide door and frame assemblies that comply with NFPA 80, *Standard for Fire Doors and Windows*, and which have been tested, listed, and labeled in compliance with ASTM E152, *Standard Methods of Fire Tests of Door Assemblies* by an independent agency acceptable to authorities having jurisdiction, for all doors and frames installed in fire-rated assemblies indicated or required by authorities having jurisdiction. Doors and frames shall also comply with the following:

1. UL 10B Fire Tests of Door Assemblies for negative test pressure
2. UL 10C Standard for Safety Positive Pressure Fire Tests of Door Assemblies
3. NFPA 252 Fire Tests of Door Assemblies for negative test pressure
4. UBC 7-2-1997 Positive Pressure Fire Tests of Door Assemblies
5. Temperature Rise Rating: Provide doors that have temperature rise rating of 450 degrees F (232C) or 250 deg. F maximum in 30 minutes of fire exposure in accordance with local building code.

D. All hollow metal side lite and doors shall comply with current state and local building codes.

1.05 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures and in accordance with requirements of the Contract Documents.

B. Provide manufacturer’s product data, installation instructions, use limitations and recommendations for each door and frame product used. Provide manufacturers’ certifications stating that products and assemblies comply with specification requirements. All Fire Doors shall bear UL label.

C. Provide large scale shop drawings, including plans, elevations, and details of anchors, anchor spacing, reinforcement, connections, hardware preparation, and accessory items required for fabrication and installation of all parts of the Work. Provide a schedule of doors and frames using the same references used on Contract Documents.

1.06 DELIVERY, STORAGE AND HANDLING

A. Strictly comply with all storage and handling requirements of the Steel Door Institute.

B. Doors and frames shall be protected from all possible damage. Doors shall be individually wrapped in cartons and identified with mark and size. Store doors upright in a protected, dry area.

C. In the event of damage, the General Contractor shall immediately make all replacements and repairs necessary, approved by the Architect, at no additional cost to the Owner.

1.07 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner's Project Manager, Architect, and related subcontractors.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, provide products of one of the following manufacturers:
   1. Steelcraft
   2. Ceco
   3. Deansteel

2.02 BASIC MATERIALS

A. Hot rolled steel shall be of commercial quality, pickled and oiled, in accordance with ASTM A 568 and ASTM A 569.

B. Cold rolled steel shall be commercial quality carbon steel in accordance with ASTM-A1008/A1008M-00 or ASTM A 568.

C. Galvanized sheet steel shall be roller leveled, commercial quality, hot dipped zinc and zinc-iron alloy coated, carbon steel sheets in accordance with ASTM-A653.

D. Anchors and fasteners shall be the approved manufacturer's standard units fabricated from not less than 18-gauge galvanized sheet steel or 18 gauge hot-dip galvanized steel, in accordance with ASTM A 153, Class C or D.

E. Shop primer shall be a thermosetting rust inhibitive primer compatible with finish system specified in Section 09 91 13 - Painting.

2.03 FABRICATION

A. Fabricate Work to be rigid, straight, plumb, level, and square. Provide Work matching sizes, shapes, and profiles indicated on approved shop drawings.

B. Fabricate exterior doors and frames from galvanized sheet steel with closed tops and bottoms and no places to catch or hold water.

C. Fabricate concealed components in doors and frames from either hot or cold rolled steel. Exterior doors shall have concealed components and reinforcing galvanized with G90 coating.

D. Fabricate doors and frames to receive mortised and concealed finish hardware as indicated on approved final hardware schedules. Comply with applicable provisions of ANSI A 115 for hardware preparation.

E. Locate hardware as indicated on final hardware shop drawings or, if not shown, in accordance with Recommended Locations for Builder's Hardware, published by Door and Hardware Institute.

2.04 FRAMES

A. Provide F Series hollow metal frames for both CMU and GWB installations, as manufactured by Steelcraft, or equal by Ceco or Deansteel, for doors, transoms, sidelights, borrowed lights and other openings as scheduled. Use concealed fastenings wherever possible.

1. Fabricate exterior door frames from 14-gauge hot dipped zinc coated steel, in accordance with requirements of ASTM A 653 and A 924 for G90 coatings. Frame profiles shall be as called for in the Drawings.
2. Fabricate all interior door frames from 16-gauge steel sheet in accordance with requirements of ASTM A 568 or ASTM-A1008/A1008M-00. Interior door frames at areas subject to corrosive conditions, including but not limited to locker rooms, toilets, and kitchen, shall be hot dipped zinc-iron alloy coated steel, in accordance with requirements of ASTM A 653 and A 924 for A60 coatings. Frame profiles shall be as called for in the Drawings.

B. All steel frames shall be assembled with mitered and fully welded corners and seams to ensure the face miter seam is "closed and tight". Weld the face seam and the full web of the frame corner or intersection. Grind and dress weld and seems to be flush and invisible after priming. Apply a zinc rich primer over all ground areas of steel frames, and finish with a matching prime paint. Knock-down frames shall be provided as indicated in the door schedule.

C. Provide steel frames and components fabricated from the following sheet steel gauges. All hinge, strike and closer reinforcements shall be projection welded to the door frames.

1. Plaster guards and mortar boxes:	26 gauge
2. Interior frames 4 ft. wide and smaller:	16-gauge steel
3. Interior frames over 4 ft. wide:	14-gauge steel
4. Exterior frames:	14 gauge, G90 coatings
5. Floor anchors:	14 gauge
6. Strike reinforcement:	14-gauge steel
7. Closer reinforcement:	12-gauge steel
8. Head channel reinforcement for frames over 4' wide:	12-gauge steel
9. Hinge reinforcement:	10-gauge steel

D. Provide profiles and shapes as shown on the Drawings free of warp, buckles, fractures, or other defects. Stops shall be formed integral with frames.

E. Provide anchors at each jamb for each 2 ft. - 6 in. of height or fraction thereof. At masonry wall locations provide T type or wire type. Provide Z type for metal studs. Provide floor anchors at both sides of all jambs. Provide UL approved anchors for fire-rated assemblies.

F. Prepare single door frames to receive 3 resilient silencers on strike jamb. Prepare double door frames to receive 2 resilient silencers at the center of the head jamb.

G. Stops shall be 5/8 in. minimum depth, cut-off and capped at 90° at 4 inches above finished floor at locker rooms, toilets, and kitchen, and where otherwise indicated. Fill and grind smooth, jamb joints below cut-off stops, making them imperceptible.

H. Interior Window Wall and Borrow Light Framing:

1. Frame assemblies for window walls and borrowed lights shall be fabricated from commercial quality 14-gauge galvanized sheet steel. Frame assemblies at areas subject to corrosive conditions, including but not limited to locker rooms, toilets, and kitchen, shall be hot dipped zinc-iron alloy coated steel, in accordance with requirements of ASTM A 653 and A 924 for A60 coatings.
2. Frame components shall be either roll formed, or brake formed. Sections shall be free of twist, bow and camber and fabricated as follows:
   a. Individual frame components shall be cut to length and notched to assure square joints and corners. All joints and corners of frames assemblies shall be continuously welded and ground smooth at the face of the sections to develop maximum structural strength.
   b. Frame assemblies shall be shipped to the jobsite completely welded. Field joints shall be permitted only when the size of the total assembly exceeds shipping limitations.
   c. Clips for field connections shall be a minimum of 14-gauge steel.
   d. Provide assemblies complete with 20-gauge channel glazing beads with countersunk holes for screw attachment to frame.

2.05 HOLLOW METAL DOORS

A. Interior doors requiring impact resistance shall be B Series, as manufactured by Steelcraft or equal by Ceco or Deansteel, in accordance with requirements of SDI Classification Level 2, Performance Level B- Heavy Duty, Model 2, with minimum 18-gauge face sheets. This type of door shall be used at corridors, cafeteria, gymnasium, locker rooms, and other locations as noted.

1. 20-gauge stiffeners.
2. Stiffeners welded to the inside of (1) face sheet and bonded to the opposite face.
   a. Vertical interior webs located 6 in. apart.
   b. Weld spacing 5 in. on center along the full height of each stiffener.
3. Stiffener height extends full height of door thickness.
4. Areas between stiffeners filled with nominal 1 pound per cubic ft. density fiberglass batt insulation.

B. Fire rated interior doors shall be T Series, as manufactured by Steelcraft, or equal by Amweld, Republic, or Deansteel in accordance with requirements of SDI Classification Level 2, Performance Level B- Heavy Duty, Model 2, with minimum 16-gauge face sheets and mineral fiberboard composite construction. Doors shall have a 450° F temperature rise label. This type of door shall be required at all stair locations.

C. Standard interior doors shall be Series L 18, as manufactured by Steelcraft, or equal by Amweld, Republic, or Deansteel, in accordance with requirements of SDI Classification Level 2, Performance Level B, Heavy Duty, Model 1, with minimum 18-gauge face sheets.

1. Face sheets shall be commercial quality, cold rolled steel, in accordance with requirements of ASTM-A1008/A1008M-00 or ASTM A 366 and A 620. Interior doors at areas subject to corrosive conditions, including but not limited to locker rooms, toilets, and kitchen, shall be hot dipped zinc-iron alloy coated steel, in accordance with requirements of ASTM A 653 and A 924 for A60 coatings.
2. Vertical edges shall be mechanically interlocked with a hairline edge seam.

3. Hinge reinforcement shall be not less than 7-gauge (3/16 in.) plate 1-1/4 in. X 10 in. or a 12-gauge continuous channel with formed holes drilled and tapped. The manufacturer shall provide test information that the continuous type of reinforcement is equal to a 3/16 in. or 7-gauge plate.
4. Reinforce tops and bottoms of all doors with a continuous steel channel of not less than 16 gages, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel shall have a steel closure channel screwed in place so that the web of the channel is flush with the face sheets of the door.
5. Door cores shall be a one-piece resin-impregnated honeycomb or polystyrene core securely bonded to both face sheets.

2.06 GLAZING STOPS

A. Provide the approved manufacturer's standard rolled steel shapes with mitered corners and countersunk, tamper proof fasteners. Location of screw heads shall be on the inside, or least public side of door.

2.07 DOOR LOUVERS

A. Provide sightproof, "V" shaped, 24-gauge, steel blade louvers, fully welded into a 20-gauge, full perimeter, steel

B. Frame, providing a minimum of 50 percent free area.

C. Provide UL labeled, self-closing, fire-rated louvers in all doors located in a fire-rated assembly, providing a minimum of 50 percent free area.

2.08 FINISHES

A. After fabrication, tool marks and surface imperfections shall be filled and sanded to make face sheets, vertical edges, and weld joints free from irregularities.

B. Provide factory primed finish on all surfaces, including galvanized and galvannealed, with a minimum 1.0 mil dry film thickness of baked rust-inhibiting primer conforming to ANSI A250.10, and compatible with finish paint specified in Section 09 91 13 - Painting. All surfaces shall be prepared in accordance with specified reference standards and written requirements of the primer manufacturer.

C. Exposed galvanized surfaces of steel doors shall be solvent wiped before application of shop coat of paint.

D. All surfaces of door frames to be concealed by installation in an exterior wall, or in contact with concrete or masonry mortar, shall receive a 1/16 in. thick coating of asphalt emulsion, after priming.

PART 3 - EXECUTION

3.01 INSPECTION

A. The H.M. Door Installer shall examine supports and conditions under which this Work is to be performed and notify the General Contractor in writing of conditions detrimental to the proper completion of the Work. Assure that frame openings correspond to dimensions of frame furnished. Do not proceed with installation until unsatisfactory conditions are corrected. Beginning Work means Installer accepts substrates and conditions.

3.02 INSTALLATION

A. Installation shall be in accordance with the approved manufacturer's written instructions, except where more restrictive requirements are specified in this Section and shall comply with applicable referenced standards.

B. Frames shall be installed prior to erection of walls and ceilings, and accurately plumb, level, aligned, squared and braced. Provide anchors at each jamb for each 2 ft. 6 in. of height or fraction thereof, at hinge locations. At masonry wall locations provide T type or wire type. Provide Z type for metal studs. Provide floor anchors at both sides of all jambs. Provide UL approved anchors for fire-rated assemblies.

C. Install hinges supplied under Section 08 71 00 – Door Hardware and hang doors accurately into frame openings with uniform tight clearances around jambs and head. Doors shall swing freely without binding or scraping and shall remain motionless at any location when released.

D. Install glazing stops where scheduled or indicated. Provide symmetrically spaced fasteners not more than 8 in. O.C.

3.03 TOLERANCES

A. Install fire-rated doors and frames with clearances and tolerances in accordance with NFPA Standard 80.

B. Install non-rated doors and frames with clearances and tolerances in accordance with SDI-100.

3.04 ADJUSTING, TOUCH-UP AND REPAIR

A. After installation of doors and hardware, adjust clearances and operating parts to Work easily, smoothly, and correctly. Doors shall not rub frame, scratch primer, nor bind.

B. Touch-up damaged shop coatings and repair minor damage to eliminate all evidence of repair. Remove and replace Work which cannot be satisfactorily repaired.

3.05 RUBBISH REMOVAL

A. The General Contractor shall remove and dispose daily all waste and debris in accordance with the requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION

SECTION 08 14 16

FLUSH WOOD DOORS

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:

1. Solid core, flush wood doors.
2. Fire rated, solid core, flush wood doors.
3. Solid core, flush wood doors, including rated frames.
4. Pre-fitting and pre-machining of wood doors
5. Factory priming/finishing of wood door and wood accessories supplied herein.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
2. Section 02 41 13 - Selective Demolition
3. Section 03 54 13 - Cementitious Underlayment
4. Section 04 20 00 – Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm

19. Section 31 20 00 – Earth Moving

1.04 QUALITY ASSURANCE

A. Provide products of one manufacturer to ensure uniformity in quality of appearance and construction for each type of door required to complete the Work of this Section.

B. Provide wood doors conforming to WDMA 1.S.1A-13, *Industry Standard for Architectural Wood Flush Doors*.

C. Allowable tolerances for fabrication of doors shall be as follows:

1. Overall dimensions shall not exceed ± 1/32 inch.
2. The maximum warp shall not exceed 1/4 inch.
3. Length of diagonal measurement from upper right corner to lower left corner of door shall be within 1/8 inch of the length of diagonal measurement from upper left corner to lower right corner.
4. Show-through telegraphing shall not exceed 1/100 deviation from true plane in any three inches span on door face.

1.05 TESTS

A. Where fire-resistance ratings are indicated, provide wood doors whose fire-resistance rating has been tested in compliance with UBC 7-2-1997 for positive pressure fire testing, and are acceptable to local authorities having jurisdiction.

B. Labels for fire doors at stairway enclosures shall reflect compliance with a maximum transmitted temperature end point of not more than 250 degrees F above ambient at the end of thirty minutes of standard fire test exposure.

1.06 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures and in accordance with requirements of the Contract Documents.

B. Submit manufacturer's product data, specifications, installation instructions, use limitations and recommendations for each door type used. Include details of core and edge construction and finishing specifications for doors to receive factory finish.

C. Provide large scale shop drawings for fabrication and installation of all doors. Provide door schedule indicating opening identifying symbol, sizes, door type and elevation, and opening cut out sizes and locations. Include details of construction, location and extent of hardware blocking, information on pre-fitting and pre-machining Work, accessory items, fire ratings and requirements for factory finishing.

D. Provide detailed specifications for all factory applied coatings and finishes.

E. Submit representative samples of each door and finish that is to be exposed in the finished Work, showing the full range of color and finish variations expected. Provide samples with a minimum area of 144 square inches, including corner construction.

F. Submit certified reports demonstrating compliance with required fire-tests.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver doors to site only after preliminary Work is complete and required temperature and relative humidity conditions are maintained. Store and handle doors in accordance with the approved manufacturer's written instructions and comply with requirements of WDMA job site information.

B. The factory seals the top and bottom rails of all doors. Store doors in areas of no great variation of heat, dryness, and humidity. Deliver all doors in individual plastic wrappers.

C. Inspect doors for damage upon delivery. Notify the Architect in writing of damage and replace damaged doors at no additional cost to the Owner.

D. Unwrap and install doors only after preliminary Work is complete and required temperature and relative humidity conditions are maintained in accordance with the approved manufacturers written requirements.

E. Proceed with Work only when wet-Work and other potentially damaging construction Work is complete.

F. Provide ventilation in accordance with the approved manufacturer's written requirements and recommendations.

1.08 WARRANTY

A. Provide a written “Lifetime Warranty” signed by manufacturer, Trade Contractor of this Section, and General Contractor, agreeing to repair or replace Work which exhibits defects in materials or Workmanship, dated from the date of Substantial Completion. "Defects" shall include, but not be limited to, warping, bowing, cupping, twisting, telegraphing of core construction, exceeding tolerance limitations of NWMA and AWI, abnormal aging or deterioration, and failure to perform in accordance with requirements of the Contract Documents.

B. Include requirement for refinishing and reinstalling doors repaired or replaced under warranty.

1.09 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner’s Project Manager, Architect, and related subcontractors.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Provide wood doors and accessory products as manufactured by VT Industries, or equal by Marshfield Door Systems or Algoma Hardwoods.

2.02 MATERIALS AND PRODUCTS

A. Provide doors complying with requirements of referenced standards for types and qualities of doors indicated.

B. Provide non-rated doors with particle board solid core, Type 1-LD-2, in accordance with ANSI A208.1.

C. Provide fire-rated doors as follows:

1. Doors requiring 30 minute and 20-minute ratings shall be fabricated with particleboard solid core, Type 1-LD-2, in accordance with ANSI A208.1.
2. Doors requiring 45, 60, and 90 minute ratings shall be fabricated with mineral core, Type FD-5, and internal blocking required for application of all hardware without use of thru bolts. Blocking shall be in accordance with the requirements of the approved hardware manufacturer. Provide fire rated wood doors as manufactured by VT Industries, or equal.

D. Provide same exposed surface on both sides of door, unless indicated otherwise.

E. Cut and trim openings in accordance with applicable requirements of referenced standards. Provide the approved manufacturer's rated metal frame, with matching veneer, at all openings and vision panels located in fire-rated doors.

2.03 INTERIOR FLUSH WOOD DOORS

A. Provide "Solid Style" VT Door Type 5502, as manufactured by VT Industries, or equal by Marshfield or Algoma. Doors shall be premium grade, Type PC-5ME, with solid 28-32 pounds particleboard core complying with WDMA 1-LD-2, 1-3/4 in. doors with transparent finish in accordance with requirements of WDMA I.S. 1-A Quality Grade, and the following characteristics:

1. Door faces shall be plain sliced, stained finish, center balance matched, select northern white maple. Pairs of doors shall be provided with book match, center balanced matched faces.
2. Provide minimum 1/16 in. solid wood edges matching the face veneer. Veneer edge bands shall not be accepted.
3. Provide lite bead VT1, and louver Model 800-A, as manufactured by VT Industries, or equal, finished to match face veneers. Lite beads shall be flush type, applied during the glazing process at the factory.
4. Factory applied finish shall be premium grade, catalyzed polyurethane, satin finish with a sheen of 31 to 45, in accordance with requirements of WDMA TR-8 Premium Grade, with three sealer coats and two topcoats.

B. Provide positive pressure "Solid Style" VT Door Type 5511, 5545, and 5P11 for pairs, as manufactured by VT Industries, or equal by Marshfield or Algoma. Doors shall be premium grade, Type FD-5, with solid mineral core, 1-3/4 in. doors with transparent finish in accordance with requirements of WDMA I.S. 1-A Quality Grade, and the following characteristics:

1. Provide manufacturer's standard mineral core construction to obtain fire-resistance rating indicated or required. Provide laminated edge construction for improved screw-holding resistance and split resistance.
2. Door faces shall be plain sliced, center balanced matched, select northern white maple. Pairs of doors shall be provided with book match, center balanced matched faces.

3. Furnish and install metal vision frame No. 115, and louver Model 1900-A, as manufactured by VT Industries, or equal, veneer wrapped to match wood face veneers.
4. Factory applied finish shall be premium grade, catalyzed polyurethane, satin finish with a sheen of 31 to 45, in accordance with requirements of WDMA TR-8 Premium Grade, with three sealer coats and two topcoats.

2.04 FABRICATION - FLUSH DOORS

A. Non-rated flush wood doors shall be fabricated in accordance with requirements of WDMA Type PC-5, and the following characteristics:
   1. Provide 28-32 lbs./cubic foot density particleboard core, in accordance with requirements of ANSI A 208.1, Grade 1-LD-2.
   2. Provide minimum 1-3/8 in. structural composite lumber top and bottom rails, and vertical stiles securely bonded to core before sanding.
   3. Provide internal blocking for application of all hardware to meet WDMA extra heavy-duty criteria, sized and located in accordance with requirements of the approved hardware manufacturer.
   4. Provide 1/8 in. minimum hardwood composition cross bands applied to the core material prior to application of the matching hardwood stiles.
   5. Provide 1/42 in. hardwood face veneers, before sanding, applied to the cross banded core in a hot press using Type 1, exterior grade, water resistant adhesive. Ease all edges. Ease shall not allow cross band to show through.
   6. Doors having more than 40 in. of their area removed for installation of lite or louvers shall have structural composite lumber cores, Type 5508 by VT Industries, or equal.

B. Fire rated flush wood doors shall be fabricated in accordance with requirements of WDMA Type FD-5, and the following characteristics:
   1. Provide 30.8 to 34.7 lbs./cubic foot density, non-combustible mineral board core.
   2. Provide minimum structural composite lumber, or “Firestop” as manufactured by VT Industries, or equal, at top and bottom rails, and vertical stiles, securely bonded to core before sanding.
   3. Provide solid internal blocking as required for application of all hardware without use of thru bolts sized and located in accordance with requirements of the approved hardware manufacturer. Through-bolt attachment of door hardware shall not be allowed.
   4. Provide 1/8 in. minimum hardwood composition cross bands applied to the core material prior to application of the matching hardwood stiles.
   5. Provide 1/42 in. hardwood face veneers, before sanding, applied to the cross banded core in a hot press using Type 1, exterior grade, water resistant adhesive. Ease all edges. Ease shall not allow cross band to show through.

2.05 PRE-FITTING AND PRE-MACHINING

A. Wood doors shall be factory pre-fit to frames and doors pre-machined for installation of door hardware in accordance with Section 08 71 00 - Door Hardware.

B. Comply with tolerance requirements of WDMA for positive pressure non-rated doors and NFPA for fire-rated doors.

C. All doors shall be beveled 1/8 in. in 2 in at lock and hinge stiles.

D. Drill all pilot holes for hinge and lock front screws at the factory.

PART 3 - EXECUTION

3.01 INSPECTION

A. The Trade Contractor of this Section shall examine frames and conditions under which this Work is to be installed and notify the General Contractor, in writing, of conditions detrimental to the proper completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected. Beginning Work means Installer accepts substrates and conditions.

3.02 PREPARATION

A. Strictly comply with manufacturers' instructions and recommendations, except where more restrictive requirements are specified in this Section.

B. Wood doors shall be stored in final locations for a period of 72 hours prior to installation to acclimate to temperature and relative humidity conditions in accordance with the approved manufacturers written requirements.

3.03 INSTALLATION

A. Wood doors shall be installed in accordance with the approved manufacturer's written instructions, except where more restrictive requirements are specified in this Section.

B. Fit and machine doors for installation of door hardware in accordance with Section 08 71 00 - Door Hardware. The restoration factory finishes before installation.

C. For non-rated doors, provide 1/8 in. clearances at head, jambs, and meeting stiles (of pairs of doors). Provide 1/2 in. clearance at bottom, except at thresholds provide 1/4 in. clearance.

D. Provide clearances for fire-rated doors in accordance with requirements of NFPA 80.

3.04 SCHEDULE

A. Wood doors shall be installed at all locations in accordance with the Door and Frame Schedule as called for on the Drawings.

3.05 ADJUSTING, CLEANING, PROTECTION

A. Adjust doors to Work easily, smoothly, and correctly.

B. Touch-up damaged coatings and finish eliminating evidence of repair.

C. Repair minor damage to eliminate all evidence of repair. Remove and replace Work which cannot be satisfactorily repaired.

D. Clean exposed surfaces using materials and methods recommended by manufacturer of material or product being cleaned. Remove and replace Work that cannot be successfully cleaned.

3.06 RUBBISH REMOVAL

A. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION

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SECTION 08 80 00

GLAZING

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, furnishing and installation of glass and glazing for the following:

1. Interior hollow metal doors with vision lite, hollow metal frames with borrowed lite, and hollow metal borrowed lite. See architectural drawings for locations.
2. Interior wood doors with vision lite. See architectural drawings for locations.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
2. Section 02 41 13 - Selective Demolition
3. Section 03 54 13 - Cementitious Underlayment
4. Section 04 20 00 – Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.04 PERFORMANCE REQUIREMENTS

A. The work of this Section shall withstand normal loads due to wind, temperature and normal impact without failure, breakage of glass or seals, fogging or other defects.
   1. Glass and glazing shall function correctly and normally throughout an ambient temperature range of 100°F above and below installation temperature.
   2. Coated glass shall be free from peeling, cracking, hazing, visual non-uniformity, and other defects throughout the warranty period.

1.05 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies: Install glass and glazing to meet the requirements of Local Building Code.
   1. Fenestration glazing shall comply with Commonwealth of Massachusetts Energy Code, 780 CMR, Chapter 13, Section 1304.3.
   2. All glazing shall comply with current state and local building codes.

B. Reference Standards:
   1. Federal Specifications:
      a. FS-DD-G-451, Glass, Float or Plate, Sheet, Figured (Flat, For Glazing, Mirrors and Other Uses).
      b. FS-DD-G-1403, Glass, Plate (Float) Sheet, Figured and (Heat Strengthened and Fully Tempered).
      c. FS-TT-S00230, Sealing Compound: Elastomeric Type, Single Component (For Caulking, Sealing and Glazing in Buildings and Other Structures).
   2. Fenestration and Glazing Industry Alliance (FGIA): Sigma 70-7-1, Glazing Recommendation for Sealed Insulating Glass Units.
   3. American Society for Testing and Materials (ASTM): E-774, Specification for Sealed Insulating Glass Units.
   4. Insulating Glass Certification Council (IGCC): Certified Products Program or A.L.T. Certification.
   5. Safety Glass Standards: Provide safety glass which complies with ANSI Z97.1 and requirements of 16 CFR Part 1201 for category II materials and is permanently marked with certification label of Safety Glass Certification Council.

C. Determine exact sizes and thicknesses of glass products and certify that the Work of this Section meets or exceeds the performance requirements specified in this Section. Provide proper thicknesses, edge clearances and tolerances to comply with the recommendations of the glass manufacturer. Provide thicknesses required for application indicated.

1.06 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures and in accordance with requirements of the Contract Documents.

B. Submit manufacturer's descriptive data, installation instructions, use limitations and recommendations for each type of glass. Provide certifications stating that materials comply with requirements.

C. Submit example copies of manufacturer's warranties before ordering materials.

D. Provide glass manufacturer's wind load charts, calculations, and certification of the performance of this Work. Show how design load requirements and other performance criteria have been satisfied.

E. Submit one 12 in. x 12 in. samples of each glass and glazing material that is to be used in the Work. Provide 12 in. long samples of sealant and glazing materials. Samples of single thickness, non-fabricated clear glass are not required.

F. Submit certified reports for tests required.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products in labeled, protective packages. Store and handle in strict compliance with manufacturer's instructions and recommendations of FGMA Handbook.

1. Protect from all possible damage.
2. Keep shipping containers closed when not in use.
3. Protect materials during storage from moisture, sunlight, excess heat, sparks, and flame.
4. Carefully store materials to avoid overloading any building component or structure.
5. Provide adequate ventilation to prevent build-up of dangerous solvent concentrations.
6. Use clean gloves and tools when handling materials. Avoid contamination.
7. Use rolling blocks and suction cups to move glass units not in shipping crates.

1.08 PROJECT CONDITIONS

A. Perform Work only when existing and forecasted weather conditions are within the limits established by manufacturers of the materials and products used.

B. Install sealants only when temperatures are within the recommended range established by sealant manufacturer and never below 40 deg. F.

1.09 WARRANTIES

A. Provide written warranties signed by manufacturer and Installer, agreeing to repair or replace Work which exhibits defects in materials or Workmanship for the following periods. "Defects" is defined to include, but is not limited to, leakage of water, abnormal aging or deterioration, failure of hermetic seal in insulating units, edge separation or delamination of laminated glass, peeling, cracking, crazing or other failure of metallic coatings in coated glass, spoiling of mirrors, and failure to meet requirements of Contract Documents. Provide warranty periods standard with manufacturer, but not less than the following:

1. Insulating Glass: 10 years from date of Substantial Completion
2. Coated Glass: 5 years from date of Substantial Completion
3. Laminated Safety Glass: 4 years from date of Substantial Completion
4. Mirror Glass: 10 years from date of Substantial Completion

1.10 MAINTENANCE STOCK

A. Provide one packaged, wrapped and labeled maintenance stock item for each different type and size of glass used on the project, except single pane clear glass which is not heat treated.

1.11 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner's Project Manager, Architect, and related subcontractors.

PART 2 - PRODUCTS

2.01 GLASS MATERIALS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear), as manufactured by Guardian Glass or equal by Vitro or Viracon.

B. Heat-Strengthened Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear), as manufactured by Guardian Glass or equal by Vitro or Viracon.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
2. For uncoated glass, comply with requirements for Condition A.
3. For coated vision glass, comply with requirements for Condition C (other coated glass).
    a. Tempered Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; Kind FT; 1/4 inch thick unless indicated otherwise.

C. Tempered Glass: ASTM C 1036 and C 1048, Condition A, Type I, Class 1, Quality q3, Kind FT as manufactured by Guardian Glass or equal by Vitro or Viracon. Tempered glass shall be subjected to quality control measures to minimize inclusions which could result in spontaneous breakage. Such inclusions are defined as a material defect by this specification. Installed tempered glass which experiences spontaneous breakage shall be replaced (material and labor) under the warranty provisions.

D. Laminated Safety Glass: ASTM C 1172 and complying with testing requirements in 16 CFR 1201 for Category II materials, as manufactured by Guardian Glass or equal by Vitro or Viracon. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Construction for Framed Units: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written recommendations.
2. Construction for Units with Exposed Edges: Laminate glass with cast-in-place and cured-transparent-resin interlayer to comply with interlayer manufacturer's written recommendations.
3. Interlayer Thickness: 0.030 in. thick for vertical glazing, 0.060 in. thick for sloped glazing.
4. Interlayer Color: Clear unless otherwise indicated.

E. Ceramic Coated Glass: ASTM C 1048, Condition B, Type I, Quality-Q3, and complying with other requirements specified.

1. Glass: Clear float.

2. Ceramic Coating Color: Color to be selected by Architect from manufacturer's standard and premium colors.

PART 3 - EXECUTION

3.01 INSPECTION

A. The Glazing Subcontractor shall examine substrates, supports, and conditions under which this Work is to be performed and notify the General Contractor, in writing, of conditions detrimental to the proper completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected. Beginning Work means Installer accepts substrates and conditions.

3.02 PREPARATION AND GLAZING

A. All Work of this Section shall comply with requirements of the FGMA *Glazing Manual*, and the approved manufacturer's written instructions and recommendations, except where more restrictive requirements are specified in this Section. Do not glaze when the ambient temperature is below 40°F.

1. Inspect all glass before installation. Do not install defective glass.
2. Check glass for correct size and squareness. Adjust frame or glass size to correct as necessary.
3. Protect glass from edge damage. Replace all damaged or weakened glass.
4. Remove coatings which are not firmly bonded to substrates. Remove lacquer, if any.
5. Center glass in opening and provide minimum 1/2 in. glass bite and 1/8 in. minimum edge clearances.
6. Place setting blocks at quarter points and side blocks at upper half of each side.
7. Securely set setting blocks and side blocks in position to prevent displacement.
8. Keep weeps clear.
9. Prevent metal to glass contact. Protect edges of insulating units from solvents and damage.
10. Replace stops and clean and prime stops, framing, and glass on both sides.
11. Cap seal all exterior joints between glazing and framing with clear liquid sealant.
12. Cap seal with a uniform fillet sealant joint having proper bite on both glass and framing.
13. Clean, prime and mask for liquid sealants immediately before sealant application.
14. Apply wet sealant in continuous motion and tool thoroughly to "wet" contact surfaces uniformly.
15. Slope sealant to promote drainage away from glass and sealant.
16. Defer glazing of openings needed for construction operations until directed.

3.03 CLEANING AND PROTECTION

A. Remove excess sealant and labels from glass surfaces. Clean exposed surfaces using materials and methods recommended by manufacturer of material or product being cleaned. Remove and replace Work that cannot be successfully cleaned. Provide temporary protection to ensure Work being without damage or deterioration at time of final acceptance. Do not apply markers to the surfaces of glass. Clean frequently, if necessary, to remove build-up of potentially harmful construction contaminants. Re-clean all glass within one week of final acceptance of the project.

B. Remove and replace all broken, chipped, cracked, scratched, or otherwise damaged glass for whatever cause.

3.04 RUBBISH REMOVAL

A. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION

SECTION 08 91 00

WALL LOUVERS

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:
   1. Pre-finished extruded aluminum stationary louvers at all masonry opening and curtainwall systems.
   2. Insect screening
   3. Install self-adhered air barrier membrane to provide air-tight closure and connection from louvers and vents to air barrier materials at cavity wall and exterior wall construction.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
   2. Section 02 41 13 - Selective Demolition
   3. Section 03 54 13 - Cementitious Underlayment
   4. Section 04 20 00 – Unit Masonry
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
   7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
   8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
   9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
   10. DIVISION 09 – FINISHES; including all Sections contained therein.
   11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
   12. Section 14 24 00 – Hydraulic Elevator
   13. Section 21 00 00 – Fire Suppression
   14. Section 22 00 00 – Plumbing
   15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
   16. Section 26 00 00 – Electrical
   17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
   18. Section 28 10 00 – Fire Alarm

19. Section 31 20 00 – Earth Moving

1.04 REFERENCES

A. AAMA 2604 – High Performance Organic Coatings on Architectural Extrusions and Panels.

B. AAMA 2605 - High Performance Organic Coatings on Architectural Extrusions and Panels.

C. AAMA 611 – Voluntary Specification for Anodized Architectural Aluminum.

D. AMCA 500 - Test Methods for Louvers, Dampers and Shutters.

E. AMCA 550 – Related Wind Driven Rain Resistant Louvers, IMC 401.5 and/or 501.3.2

F. AMCA 511 - Certified Ratings Program for Air Control Devices.

G. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

H. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

I. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

J. ASTM D822 - Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings

K. ASTM D4214 - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.

L. ASTM D2244 - Standard Test Method for Calculation of Color Differences From Instrumentally Measured Color Coordinates.

1.05 DEFINITIONS

A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.

B. Horizontal Louver: Louver with horizontal blade, i.e., the axes of the blades are horizontal.

C. Vertical Louver: Louver with vertical blade, i.e., the axes of the blades are vertical.

D. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.

E. Rain-Resistant Louver: Louver that provides specified wind-driven rain performance, as determined by testing according to AMCA 500-L and AMCA 550, IMC 401.5 and/or 501.3.2.

1.06 ACTION SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures and in accordance with requirements of the Contract Documents.

B. Submit manufacturer's product data, installation instructions, certified performance data, including a statement demonstrating compliance with specified free air area requirements, and finish specifications. Provide manufacturer certifications demonstrating materials and performance comply with specified requirements.

C. Provide large scale shop drawings including elevations, details of anchorages, connections, joinery, fasteners, accessory items, and all other relevant information, required for fabrication, installation, and erection of the Work of this Section.

D. Take accurate field measurements prior to preparation of shop drawings and final fabrication so as not to delay job progress.

E. Submit a 12 in. x 12 in. mock-up of the required louver/damper showing fabrication and assembly details. Submit 3 in. x 3 in. finish samples of the material to be exposed in the finished Work, showing the full range of color and finish variations expected. Color shall be selected by the Architect from the approved manufacturer's complete line of standard and premium colors.

1.07 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer and Installer.

B. Product Test Reports: For each type of louver, for tests performed by a qualified testing agency.

C. Field quality-control reports.

D. Sample Warranties: For manufacturer's warranties.

1.08 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. The manufacturer shall have implemented the management of quality objectives, continual improvement, and monitoring to assure that customer needs and expectations are met.
   2. The manufacturer shall be International Organization for Standardization (ISO) 9001 accredited.

B. Product Qualifications:
   1. Louvers shall be factory engineered to withstand the specified seismic loads.
      a. Minimum design loads shall be calculated to comply with ASCE – 7, or local requirements of Authority Having Jurisdiction (AHJ).
   2. Recycled Content: Provide louver that incorporates recycled content materials. The louver shall consist of the following recycled content:
      a. Fabricated aluminum recycled content 73 percent by weight. 18 percent post-consumer, 55 percent pre-consumer.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store materials in a dry area indoors, protected from damage and in accordance with manufacturer's instructions.

C. Handling: Protect materials and finishes during handling and installation to prevent damage.

D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.10 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside the manufacturer's absolute limits.

1.11 WARRANTY

A. The manufacturer shall provide a standard limited warranty for louver systems for a period of five years (60 months) from date of installation, no more than 60 months after shipment from manufacturing plant. When notified in writing from the Owner of a manufacturing defect, manufacturer shall promptly correct deficiencies without cost to the Owner.

B. Manufacturer shall provide a 20-year limited warranty for fluoropolymer-based finish on extruded aluminum substrates. Finished coating shall not peel, blister, chip, crack, or check. Chalking, fading or erosion of finish when measured by the following tests:

1. Finish coating shall not chalk excess of 8 numerical ratings when measured in accordance with ASTM D4214.
2. Finish coating shall not change color or fade excess of 5 NBS units as determined by ASTM D2244 and ASTM D822.
3. Finish coating shall not erode at a rate excess of 10 percent/ 5 year as determined by Florida test sample.

C. The manufacturer shall provide a 5 year' limited warranty for Class I and a 3-year limited warranty for Class II anodized finish on extruded aluminum substrates.

1. The seller warrants the Finish under normal atmospheric conditions.
    a. Will not crack, craze, flake, or blister.
    b. Will not change or fade more than (5) Delta-E Hunter units as determined by ASTM method D-2244
    c. Will not chalk excess of ASTM D-4214-07 number (8) rating, determined by the procedure outlined in ASTMD-4214-07 specification test.
2. Any forming or welding must be done prior to finishing. Post-forming or welding will void the warranty.
3. This Warranty applies only if the anodized aluminum product is installed in strict accordance with Seller's recommended practices and maintained in accordance with AAMA (American Architectural Manufacturers Association) publication number 609 and 610-09 ("Cleaning and Maintenance Guide for Architecturally Finished Aluminum").

1.12 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner's Project Manager, Architect, and related subcontractors.

PART 2 - PRODUCTS

2.01 STATIONARY BLADE LOUVERS

A. The stationary blade louvers shall be Model No. EME520DD, manufactured by Ruskin Company or equal by Air-o-Lite Louvers or Greenheck.

B. Fabrication: Extruded Aluminum stationary horizontal chevron louver style.

1. Design: Double drainable blades shall be contained within the frame with double downspouts in jambs and mullions. The louver design shall limit span between visible mullions to 120 in.
2. Frame:
    a. Frame Depth: 5 in.
    b. Wall Thickness: 0.081 in., nominal.
    c. Material: Extruded aluminum, Alloy 6063-T6.
3. Blades:
    a. Style: Sightproof, double drainable, horizontally mounted on 2 in. centers, nominal.
    b. Material: Extruded aluminum, Alloy 6063-T6.
    c. Wall Thickness: 0.063 in., nominal.
4. Minimum assembly size: 12 in. wide by 12 in. high
5. Recycled Content: 18 percent post-consumer. 55 percent pre-consumer, post-industrial, total 73 percent by weight.
6. Colors: Colors shall be selected by the Architect from the approved manufacturer's complete selection of standard and premium colors

C. Performance Data:

1. Based on testing 48 in. x 48 in. size unit in accordance with AMCA 500-L and AMCA 550, IMC 401.5 and/or 501.3.2
2. Free Area: 44 percent, nominal.
3. Free Area Size: 6.99 square feet
4. Maximum Recommended Air Flow through Free Area: 1,361 fpm
5. Air Flow: 9514 cfm (4.49 m^3/s).
6. Maximum Pressure Drop (at 1361 feet per minute): 0.20 in. w.g.

D. Wind Driven Water Penetration Performance:

1. Based on testing 39 in. x 39 in. core area, 41 in. x 44 in. nominal size unit in accordance with AMCA 500-L and AMCA 550, IMC 401.5 and/or 501.3.2.
2. Wind Velocity: 29 mph
    a. Rainfall Rate: 3 in./hour
    b. Free Area Velocity: 1361 feet per minute
    c. Water Resistance Effectiveness: 99.7 percent (AMCA Class A).
3. Wind Velocity: 50 mph
    a. Rainfall Rate: 8 in./hour
    b. Free Area Velocity: 778 feet per minute (4.0 m/s).
    c. Water Resistance Effectiveness: 99.0 percent (AMCA Class A).

E. Design Wind Load: Incorporate structural supports required to withstand wind load of 149 mph.

F. Louvers shall be factory engineered to withstand the specified seismic loads.
   1. Minimum design loads shall be calculated to comply with ASCE – 7, or local requirements of Authority Having Jurisdiction (AHJ).

2.02 ACCESSORIES

A. Insulated Aluminum Blank-Off Panels: 0.040 in. aluminum sheet, 2 in. aluminum skin insulated core, factory installed with removable fasteners and neoprene gaskets.

B. Hinged Frame: Continuous piano hinge attached to angle subframe.

C. Filter Racks: Formed channel racks to accept standard 2 in. thick filters. Unused bottom portion blanked off with 0.040 in. aluminum sheet.

D. Security Bars:
   1. Location: Front.
   2. Construction: Aluminum, 3/4 in., welded to louver.

E. Insect Screens:
   1. Aluminum: 18-16 mesh, mill finish, .011 in. wire.
   2. Frame: Aluminum.

F. Extended Sills:
   1. Extruded aluminum, Alloy 6063-T6. Minimum nominal thickness 0.060 inch (1.5 mm).

G. Visible Mullions: Manufacturer's standard horizontal or vertical visible mullions for architectural accent as indicated on drawings.

2.03 FINISHES

A. Finish: Mill finishes.

B. Color: Color shall be selected by the Architect from the approved manufacturer's complete selection of standard and premium colors.

C. Anodized Finish:
   1. Class II Clear Anodized.
      a. Comply with Aluminum Association AA-C21A31. Clear anodized finish 204-R1.
      b. Apply finish following chemical etching and pretreatment.
      c. Minimum Thickness: 0.4 mils, 30-minute anodizing process.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Inspect areas to receive louvers. Notify the Architect of conditions that would adversely affect the installation or subsequent utilization of the louvers. Do not proceed with installation until unsatisfactory conditions are corrected.

B. If opening preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean opening thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Install louvers at locations indicated on the drawings and in accordance with manufacturer's instructions.

B. Install louvers plumb, level, in plane of wall, and in alignment with adjacent work.

C. Install air barrier membrane flashings to ensure air and weathertight construction and assembly. Air barrier membrane flashing material shall comply with requirements of Section 07 25 00 – Weather Barriers.

3.04 CLEANING

A. Clean louver surfaces in accordance with manufacturer's instructions.

B. Touch-up, repair or replace damaged products before Substantial Completion.

3.05 RUBBISH REMOVAL

A. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION

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SECTION 09 22 16

NON-STRUCTURAL METAL FRAMING AND GYPSUM BOARD

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:

1. Metal framing and support systems for gypsum drywall, abuse resistant gypsum panels, moisture resistant board, and silicone treated, fiberglass reinforced, cementitious backer board, and related accessories.
2. Gypsum Wallboard, Abuse Resistant Gypsum Wallboard, Mold Resistant Gypsum Wallboard, Cement Board; Gypsum Liner Panel; and related accessories.
3. Fiberglass insulation at interior partitions and other locations indicated on the Drawings.
4. Gypsum wallboard ceiling and soffit.
5. Drywall suspension system.
6. Surface finishing in preparation for painting and finishing.
7. Miscellaneous metal framing and blocking to support other Work.
8. Accessories including seal plate, metal closure plate, fasteners, and taping materials, are necessary for complete installation.
9. Gypsum wallboard assemblies for chases, mechanical equipment noise control enclosures, and other miscellaneous enclosures.
10. Caulking in between gypsum-to-gypsum wallboard and control joints or intersecting walls and ceilings.

B. Items to be Installed Only: Install sleeves for piping and conduit as furnished under the Work of the following Sections and Divisions:

1. Section 21 00 00 - Fire Suppression
2. Section 22 00 00 - Plumbing
3. Section 23 00 00 - HVAC
4. Section 26 00 00 - Electrical

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
2. Section 02 41 13 - Selective Demolition
3. Section 03 54 13 - Cementitious Underlayment
4. Section 04 20 00 – Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.04 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design framing, including comprehensive engineering analysis by a qualified professional engineer registered in the state in which the Project occurs, using performance requirements and design criteria indicated.

B. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.

1. Design loads in accordance with current building code requirements and the Contract Documents.
2. Deflection limits of framing systems shall withstand design loads within deflections greater than Horizontal deflection of l/360 of the wall height under a horizontal load of 5 lbs./sq. ft.
3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg. F.
4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load, plus superimposed dead load, deflection of primary building structure.

C. Sound Transmission Performance:

1. Provide gypsum drywall assemblies with a minimum STC value of 47 at Administrative, Guidance, and SPED Suites, when tested in accordance with ASTM E90.

1.05 QUALITY ASSURANCE

A. Structural Performance for all Interior Work: Limit deflection to L/360 for ceramic tile and other rigid finishes; do not exceed L/240 for all other finishes. Lateral load is 5 psf.

B. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, ductility, and metallic-coating thickness.

C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, *Structural Welding Code—Steel*, and AWS D1.3, *Structural Welding Code--Sheet Steel*.

D. Anchorage: Coordinate anchorage to concrete and steel with project structural requirements, through the submittal process as specified.

E. Installation shall be performed by a firm with a minimum of ten-year experience in Work of the type required by this Section. Conduct pre-installation conference at Project site in accordance with requirements of Division 01 and this Section.

1. Provide materials which are the products of one manufacturer for each type of material required for the Work of this Section. Provide secondary accessory materials acceptable to the approved manufacturer of the primary materials and the Architect.

F. Reference Standards: Comply with applicable requirements of the following:

1. AISI Standard; North American Specification for the Design of Cold-Formed Steel Structural Members
2. AISI Standard for Cold-Formed Steel Framing - General Provisions
3. AISI Standard for Cold-Formed Steel Framing - Truss Design
4. AISI Standard for Cold-Formed Steel Framing - Header Design
5. Terminology Standard: Gypsum Association Publication GA-505, GA-201 and GA -216.
6. American National Standards Institute (ANSI): A108.11, American National Standard for Interior Installation of Cementitious Backer Units.

1.06 TESTS

A. Where fire-resistance ratings are indicated or required by authorities having jurisdiction, provide materials and construction which are identical to assemblies whose fire-resistance rating has been tested in compliance with ASTM E119 and ASTM E136 by independent agencies acceptable to the Architect and authorities having jurisdiction.

1.07 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures and in accordance with requirements of the Contract Documents.

B. Submit manufacturers product literature for all items with schedule of use, installation instructions, and recommendations for each material used.

C. Submit manufacturers certificates demonstrating compliance with applicable code for fire-rated assemblies.

D. Shop Drawings: Show layout, spacing, sizes, thicknesses, and types of metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work including but not limited to the following items:

1. Details of all unusual conditions in connection with gypsum drywall construction.
2. Proposed locations of control joints that are required but not shown.
3. Locations of access doors occurring in gypsum drywall construction.
4. Details of attachment to primary ceiling supports.
5. Details of rated assemblies with copies of their respective approval
6. Anchorage to concrete and steel for approval by Structural Engineer.

E. Delegate design submittal for metal framing as indicated to comply with performance requirements and design criteria, including analysis/calculation data bearing the seal and signature of the Professional Engineer registered in the state responsible for their preparation.

F. Welding certificates.

G. Qualification data for professional engineer.

H. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:

1. Steel sheet
2. Expansion anchors
3. Power-actuated anchors
4. Mechanical fasteners
5. Vertical deflection clips
6. Miscellaneous structural clips and accessories

I. Samples:

1. One-foot square samples of board materials.
2. One-foot sections of all galvanized steel or zinc members and accessories.

1.08 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products in unopened factory labeled packages. Store and handle in strict compliance with manufacturers ft. instructions and recommendations. Protect from damage. Adequately support stored gypsum panels to avoid sagging. Avoid overloading floor system. Protect metal lath, metal suspension materials and metal accessories from dampness and wetting. Keep plaster and other cementitious materials dry until ready to be used. Store off ground, under cover, and away from sweating walls and other damp surfaces.

B. Deliver fire-rated materials in original, unopened containers, bearing testing agency label and required fire classification numbers.

1.09 PROJECT CONDITIONS

A. Perform Work only when existing and forecasted weather conditions are within the limits established by manufacturers of the materials and products used. Comply with requirements of Gypsum Association publication 220.

B. Proceed with installation of gypsum board products provided under the Work of this Section only when steel framing Work is completed in accordance with installation tolerances specified in ASTM C 754 and this specification Section.

C. Do not expose gypsum boards or metal accessories to weather during storage.

D. Comply with the approved manufacturers requirements and Gypsum Association publication 216. Avoid too rapid drying in hot weather.

1.10 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner's Project Manager, Architect, and related subcontractors.

B. Items such as exterior finish assemblies, wall interfacing, expansion joint locations, caulking materials, firesafing applications, mechanical and electrical wall penetration treatment shall be reviewed.

1.11 FLAME SPREAD AND SMOKE DEVELOPED LIMITATIONS

A. Interior finish materials shall be classified in accordance with ASTM E 84 or UL 723. Such interior finish materials shall be grouped in the following classes in accordance with their flame spread and smoke-developed indexes.

1. Class B: Flame spread index 26-75; smoke- developed index 0-450.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Gypsum Board: Provide products of one of the following manufacturers if they meet or exceed the requirements of these specifications:

1. United States Gypsum Company
2. LaFarge North America
3. National Gypsum Company

B. Metal Framing and Support: Provide products of one of the following manufacturers if they meet or exceed the requirements of these specifications:

1. Clark Dietrich
2. United States Gypsum Company
3. MarinoWare
4. EB Metal

2.02 GYPSUM BOARD MATERIALS

A. Abuse Resistant Gypsum Wallboard shall be Sheetrock Mold Tough Very High Impact (VHI) Firecode X, as manufactured by United States Gypsum Company or equal by Lafarge North America or National Gypsum Company, to provide a Category 3, Heavy Duty assembly. Panels shall be a non-combustible combination of gypsum, cellulose fiber, and reinforcing fiber mesh, with paper face, complying with requirements of ASTM C 36 and C 1278, and the following material and performance characteristics:

1. Thickness: 5/8 in.
2. Weight: 2.8 lbs./SF

3. Flame Spread: 5, in accordance with ASTM E 84
4. Smoke Developed: 0, in accordance with ASTM E 84
5. Recycled Content: 95 percent
6. Mold Resistance: 10, in accordance with ASTM D3273
7. Abrasion Resistance: Level 2, 0.059 in. in accordance with ASTM C1629
8. Indentation Resistance: Level 1, 0.15 in. in accordance with ASTM C1629
9. Soft Body Impact: Level 3, 300 ft./lbs in accordance with ASTM C1629
10. Hard Body Impact: Level 3, 150 ft./lbs. in accordance with ASTM C1629
11. Flexural Strength: 243 ft. lbs., either direction
12. Edges: Tapered
13. Ends: Square

B. Abuse Resistant Gypsum Wallboard shall be Sheetrock Brand AR Firecode X Panels, as manufactured by United States Gypsum Company or equal by Lafarge North America or National Gypsum Company, to provide a Category 3, Heavy Duty assembly. Panels shall be a non-combustible combination of gypsum, cellulose fiber, and reinforcing fiber mesh, with paper face, complying with requirements of ASTM C 36 and C 1278, and the following material and performance characteristics:

1. Thickness: 5/8 in.
2. UL Type Designation: AR
3. ASTM E136 Non-combustibility: Meets.
4. ASTM E84 Surface-Burning Characteristics:
    a. Flame Spread: 15
    b. Smoke Developed: 5
    c. Class A (Flame spread not greater than 25 and smoke developed not greater than 450): Meets.
5. ASTM C473, Standard Test Methods for Physical Testing of Gypsum Panels Products
    a. Core Hardness
        1) Field [Not less than 11 lbf (49 N)]: Meets.
        2) End [Not less than 11 lbf (49 N)]: Meets.
        3) Edge [Not less than 11 lbf (49 N)]: Meets.
    b. Flexural Strength
        1) Parallel [Not less than 46 lbf (205 N)]: Meets.
        2) Perpendicular [Not less than 147 lbf (654 N)]: Meets.
    c. Nail Pull Resistance [Not less than 87 lbf (387 N)]: Meets.
    d. Humidified Deflection [Not greater than 5/8 in. (15.9 mm)]: Meets.
    e. Thickness: 5/8 in. (15.9 mm)
    f. Length: 8-10 ft. (2438-3048 mm), 12 ft. (3658 mm)
    g. Width: 4 ft. (1219 mm)
    h. Weight: 2.8 lb./sq. ft. (13.7 kg/sq. m)
    i. Edge: Tapered

C. Gypsum Wallboard shall be Sheetrock Mold Tough Firecode X, as manufactured by United States Gypsum Company, or equal by Lafarge North America or National Gypsum Company. Panels feature a non-combustible, moisture resistant gypsum core, complying with requirements of ASTM C1396, and the following material and performance characteristics:

1. Thickness: 5/8 in.
2. Weight: 2.2 lbs./SF
3. Flame Spread: 15, in accordance with ASTM E 84
4. Smoke Developed: 0, in accordance with ASTM E 84
5. Recycled Content: 100 percent
6. Edges: Tapered
7. Ends: Tapered

D. Mold-Resistant Gypsum Wallboard shall be Fiberock Aqua-Tough AR Interior Panels as manufactured by United States Gypsum Company, or equal by ProRoc or Certainteed. Panels shall be provided at Toilet Rooms and Locker Rooms. Panels shall non-combustible and comply with requirements of ASTM C 1178, C 1278, and C 1396, and the following material and performance characteristics:

1. Thickness: 5/8 in.
2. Flame Spread: 0, in accordance with ASTM E 84
3. Smoke Developed: 5, in accordance with ASTM E 84
4. Recycled Content: 95 percent
5. Mold Resistance: 10, in accordance with ASTM D 3273-00
6. Surface: Coated glass mat on face, back, and long edges
7. Edges: Tapered
8. Ends: Square

E. Cement Board shall comply with requirements of ANSI A 118, and the following performance properties:

1. Thickness: 5/8 in.
2. Ends: Square cut
3. Edges: Formed and smooth
4. Matrix: Aggregated Portland Cement, reinforced with glass fiber mesh

F. Gypsum Liner Panel shall be 1 in. thick, fire resistance Type X, complying with ASTM C1396, Mold Defense Shaft Liner Type X panels as manufactured by Lafarge North America, or equal by United States Gypsum Company or National Gypsum Company.

2.03 METAL FRAMING AND SUPPORTS

A. Provide steel studs, CT studs, runners, expansion tracks, furring, and channels, hot dip galvanized, in accordance with ASTM A 653 and C 645, as follows:

1. Depth shall be as indicated on the Drawings, including but not limited to, 3-5/8 in., 6 in., and 8 in.
2. The Gauge shall be 22 EO, 0.15 in. bare metal; 0.034 in. dimple to dimple, unless otherwise required by the approved manufacturer to comply with conditions, spans and deflection constraints indicated. Provide 20 DW gauge EO, .025 in. bare metal; .055 in. dimple to dimple studs for walls supporting rigid finishes, including but not limited to, fiber cement panels, ceramic tile, and silicone treated, fiberglass reinforced, gypsum board at exterior walls. Provide 16 DW gauge EO, 0.025 in. bare metal; 0.055 in. dimple to dimple studs for exterior framing at soffits, fascia, and mansards, unless otherwise noted or required.
3. Runner channel shall match stud type as recommended by the approved stud manufacturer.

4. Provide 25 gauge, G60 galvanized furring in accordance with ASTM A 653 and C 645, and 20 gauges where spans exceed 4 ft. Furring shall be hat shaped or Z-shaped necessary to complete the Work. Where indicated as resilient, provide special sound transmission reducing type, USG RC-1, or equal.
5. Provide 18 gauge, G60, 7/8 in., 2-1/2 in., 3-1/2 in., 7/8 in., and Z furring.
6. Hanger Wire shall be 9 gauges, soft temper, Class 1, galvanized, complying with ASTM A 641.

2.04 METAL TRIMS AND ACCESSORIES

A. Provide galvanized steel trim units for interior Work at all areas subject to high humidity, including locker rooms, shower rooms, and kitchen. Provide the following trim and accessory types as manufactured by United States Gypsum, or equal from a specified manufacturer:
   1. Corner Bead: USG No. 103, 1-1/4 in.x1-1/4 in., or equal
   2. Control Joint: USG No. 093, 1/4 in. wide by 7/16 in. deep opening, or equal.
   3. Edge Trim: USG No. 801-A and 801-B, or equal

B. Channels:
   1. Furring channels shall be USG No. DWC-25 and DWC-20, or equal.
   2. Resilient furring channels shall be USG No. RC-1, or equal.
   3. Cold rolled channels shall be 16 gauges, galvanized steel, as manufactured by USG, or equal.

2.05 DRYWALL SUSPENSION SYSTEM AND TRANSITION

A. The Drywall suspension system shall be commercial quality hot-dipped galvanized steel as provided by the approved acoustic tile ceiling manufacturer and required to provide a 30 years' full system warranty by the approved manufacturer.
   1. Provide 1 1/2 in. x 12 ft. HD drywall main beam, HD8906, as manufactured by Armstrong, or Architect approved equal by USG and Certainteed.
   2. Provide 1 1/2 in. x 6 ft. drywall cross tee, XL8965, as manufactured by Armstrong, or Architect approved equal by USG and Certainteed.
   3. Provide 1 1/2 in. x 10 ft. wall molding, KAM 1510 as manufactured by Armstrong.
   4. Provide hangar wire, class 1 zinc coating, soft temper, pre-stretch, with a yield stress load three times the design load, but not less than 12 gauge.
   5. Provide transitions Armstrong AXTR with height as noted on the drawings.
      a. F Molding # 7906
      Axiom Transition # AXTR7906STR.

2.06 AIRCRAFT CABLES

A. Provide 1/8 in. diameter, 250 lbs. working load, stainless steel aircraft cables, Model No. ZF-30X2 as manufactured by Grip Lock or equal.

B. The looping gripper shall be reverse release, Type 30, ZF Standard Gripper as manufactured by Grip Lock or equal.

2.07 JOINT MATERIALS

A. Joint Compound shall be Durabond, as manufactured by USG, or equal, at areas to receive abuse resistant gypsum wall panels. Provide water resistant compound, USG Sheetrock Brand W/R, or equal, at locations of water, mold, and moisture resistant gypsum wall panels.

B. Joint tape shall be non-perforated paper tape, complying with the requirements of ASTM C 475.

C. Provide Sheetrock Brand, Tuff-Hide Primer-Surfacer, as manufactured by United States Gypsum, or equal, at locations of abuse resistant gypsum wall panels, to provide a Level 4 finish.

2.08 SEAL PLATE

A. Provide 5-1/2 in., polyethylene foam sill plate gasket at the bottom of exterior CFMF channel, ProPINK ComfortSeal, Model # 193689 as manufactured by Owens Corning or equal by Dupont and Rona. The seal plate shall comply with the following properties:

1. Assembled Depth: 15 in.
2. Assembled Height: 5.5 in.
3. Assembled Weight: 0.88 lbs.
4. Assembled Width: 15 in.

2.09 METAL CLOSURE PLATE

A. Provide 16-gauge metal closure plate at steel columns located at masonry corners of building and elsewhere as indicated in the plan details. The metal closure plate shall allow the continuation of vapor barrier.

2.10 FIBERGLASS BATT INSULATION

A. Provide fiberglass insulation at interior partitions and other locations as indicated on the Drawings, including exterior soffits, parapet wall, and fascia framed under the work of this Section, shall be Type I, un-faced, inorganic fiber blankets, complying with ASTM C 665, with the following features and characteristics:

1. Thickness: 3-1/2 in., 6 in., or as otherwise required to fill cavity.
2. Flame Spread: 10; in accordance with ASTM E84
3. Smoke Developed: 0; in accordance with ASTM E84
4. Combustion Characteristics: Passes ASTM E 136.
5. Fire Resistance Ratings: Passes ASTM E 119 as part of a complete fire tested wall assembly.
6. Dimensional Stability: Linear Shrinkage less than 0.1 percent
7. Recycled Content: 30 percent post-consumer

2.11 PARTITION CLOSURE

A. Provide extruded aluminum partition closure, 6063-T5, tensile strength 31 KSI (ASTM B 221, ATM B 221M) for 2-7/8 in. to 3-15/16 in. openings, Mullion Mate (Series 40 Plus) as manufactured by Gordon Interior Specialties Division, Gordon Inc or equal. The partition closures are pre-assembled, and spring loaded to provide a tight fit for vertical junctures of partitions.

B. The acoustical batt for sound attenuation and factory-supplied caulk shall be field installed for acoustical performance purposes.

C. Provide brake formed, aluminum extruded end caps of partition walls, Mullion Mate End Caps as manufactured by Gordon Inc. or equal.

D. Provide metals free from surface blemishes and exposed to view in finished unit. Surfaces that exhibit pitting, seam marks, roller marks, stains, and discolorations, or other imperfections on finished units are not acceptable. All metal shall be of the highest-grade commercial type.

E. All material shall be factory anodized in clear or medium bronze.

2.12 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035 or ASTM A 780.

1. Provide interior, field-applied paint with a VOC content of 250 g/L or less, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Shims: Load bearing, high-density multi-monomer plastic, non-leaching.

C. Laminating adhesive shall be recommended by the approved gypsum board manufacturer.

D. Fasteners shall be Type S, bugle head, for attaching gypsum panels to steel framing. Fasteners for fiber cement panels attached to steel framing shall be corrosion resistant, Hi-Lo, S-12, bugle head screws. Provide wafer head, *Climaseal* coated, Type S-12 self -drilling screws for attaching silicone treated sheathing to steel framing. Provide stainless steel fasteners for all fasteners in wet or humid areas, including but not limited to exterior assemblies, toilet rooms, shower rooms, locker rooms, and kitchen. Provide other types in accordance with requirements of the approved gypsum board or fiber cement board manufacturer. All fasteners shall provide a minimum of 3/4 in. penetration through steel framing.

E. Provide screws, bolts, powder actuated fasteners, inserts and other fasteners that are customarily used in standard construction practices and which are proven capable of supporting at least 3 times design load.

F. Provide rigid vinyl trim at locations where gypsum board edge is exposed or abutting dissimilar materials, except at all areas of interior Work subject to high humidity, including locker rooms, shower rooms, and kitchen. Trim shapes shall be RP-2, RP-4, and RP-46, as manufactured by USG, or equal.

G. Provide the approved manufacturers joint sealing tape for sealing of all horizontal and vertical joints in silicone treated gypsum sheathing.

H. Provide 18-gauge, 1/8 in. thick, 4142 flat stocks, at all tack boards, marker boards, and interactive whiteboards.

PART 3 - EXECUTION

3.01 INSPECTION

A. The Installer/Erector shall examine substrates, supports, and conditions under which this Work is to be performed and notify General Contractor, in writing, of conditions detrimental to the proper completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected. Beginning Work means Installer accepts substrates and conditions.

3.02 INSTALLATION OF GYPSUM BOARD AND RELATED PRODUCTS

A. Strictly comply with the approved manufacturers' written instructions and recommendations, except where more restrictive requirements are specified in this Section.

B. Framing:

1. Install and erect framing in accordance with requirements of ASTM C 754. Provide framing to comply with published details and recommendations of the approved manufacturer, and the Gypsum Construction Handbook, as published by USG.
    a. Framing shall not bridge building construction or control joints; frame separately on both sides and allow for movement.
    b. Isolate framing system from structural loading both horizontally and vertically.
    c. Provide slip or cushioned joints at top of walls. Maintain lateral stability and acoustical performance.
    d. All partitions, including framing and wallboard, shall be terminated at structural deck above, except as noted otherwise.
    e. Space framing members at 16 in. o. c., unless indicated otherwise, or as otherwise required to meet specified deflection requirements.
    f. Cut metal studs 1/2 in. short of top track.

C. Secure ceiling framing to structure above using hangers and fasteners capable of supporting at least 3 times actual loads.

D. Installation of gypsum board and all related materials shall be in strict compliance with requirements of ASTM C 840 and Gypsum Association Publication No. 216, *Recommended Specifications for the Application and Finishing of Gypsum Board,* and the following:

1. Locate joints between boards as far from the center of walls and ceilings as possible.
2. Stagger vertical joints on opposite sides of walls and in multiple layer Work.
3. Install gypsum and related board materials with face side out and with joints over framing members.
4. Do not butt dissimilar board edges.
5. Cover both faces of stud partitions, except at chase walls.
6. Attach boards to framing with self-tapping, bugle head screws or fasteners recommended by manufacturer.
7. Space fasteners as recommended by the manufacturer.
8. Install drywall ceilings prior to gypsum board walls.

a. Provide two layers of gypsum board at selected ceilings as indicated on the Drawings for sound reduction.

9. Provide water, mold, and mildew resistant interior wall panels at all Toilet Rooms and Locker Rooms.
10. Provide abuse resistant panels at all interior gypsum board partitions, as indicated on the Drawings.
11. Provide water and mold resistant exterior wall sheathing panels at all exterior wall assemblies, soffits and overhangs as called for in the Drawings.
12. In multiple layer walls, provide backing board or multiple layers of face board.
13. Form control joints by preparing space between edges to receive metal control joint trim.
14. Do not use tapered edges at doors, windows, or casing beads.

E. Provide all additional supplemental framing at openings in walls and ceilings as may be required to comply with written requirements of the approved manufacturer, and the *Gypsum Construction Handbook*, as published by USG.

F. Fiberglass insulation at all interior and exterior locations shall be friction fit into spaces between LGMF, including wall cavities, soffits, fascia, and other voids. Fit insulation closely around openings and penetrations. Provide supplemental stick-clips as needed to hold insulation in cavities and prevent falling.

G. Strictly comply with manufacturer's instructions and recommendations for installation of metal trims and accessories. Meet installation tolerance requirements.

1. Provide corner bead trim at all external corners. Provide joint reinforcing tape at all internal corners.
2. Provide control joints where shown, or not less than 30 ft. O.C., at locations approved by the Architect.
3. Provide edge trim wherever edge of gypsum board is exposed, revealed, abutting dissimilar materials.
4. Provide galvanized trim accessories at all Toilets.

H. Provide 3 coats joint compound treatment at all joints, flanges of trim accessories, penetrations, fastener heads and surface defects. Provide Level 4 finish at all interior areas to receive gypsum wall panels, and prior to application of primer/surfacer at locations of abuse resistant gypsum wall panels.

1. Extend joint finishing to floor behind wall base to provide a smooth flat surface for installation of wall base.
2. For water-resistant board applications, use special water-resistant joint compounds to seal joints, cover fastener heads, fill surface defects and seal cut edges.

I. Install joint tape at all horizontal and vertical joints located in silicone treated gypsum sheathing at exterior walls in accordance with the approved manufacturers written instructions.

J. Provide prefabricated suspended acoustic panels at Auditorium, Band Room, Music/Choral Room, and as indicated on the Drawings.

3.03 TOLERANCES

A. The following installed tolerances for gypsum drywall are allowable variations from locations and dimensions indicated by the Contract Documents and shall not be added to allowable tolerances indicated for other Work.

1. Allowable Variation from True Plumb, Level, & Line: ± 1/8 in. in 20 ft.-0 in.

B. After finishing joints and screw heads shall be flush and invisible. Surfaces shall appear flush, smooth, seamless, and uniform. Planes shall be flat. Corners shall be crisp and at true angles. Where gypsum drywall is in contact with dissimilar materials, joints shall be tight and shall be accurately scribed to adjacent construction without gaps.

3.04 ADJUSTING, CLEANING, AND PROTECTION

A. Cut, patch, repair and point Work as needed to accommodate other Work and to repair cracks and defective surfaces. Eliminate blisters, check cracking, dried out spots and all other defects and problem areas. Repair minor damage to eliminate all evidence of repair. Leave Work including trims and accessories ready for finishing.

B. Clean adjacent surfaces using non-abrasive materials and methods to make adjacent Work in “as-found” condition, undamaged by plaster operations. Remove and replace Work that cannot be successfully cleaned or repaired.

C. Provide temporary protection to ensure completed Work is without damage or deterioration at time of final acceptance. Remove protections and re-clean as necessary immediately before final acceptance.

3.05 RUBBISH REMOVAL

A. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 50 00 – Temporary Facilities and Controls.

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SECTION 09 23 00

GYPSUM PLASTER AND METAL LATH

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:

1. Gypsum plaster
2. Metal lath
3. Surface finishing
4. Accessories

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
2. Section 02 41 13 - Selective Demolition
3. Section 03 54 13 - Cementitious Underlayment
4. Section 04 20 00 – Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.04 REFERENCES

A. American Society for Testing and Materials (ASTM):

B. A 641, Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

C. C 28, Specification for Gypsum Plasters.

D. C 35, Specification for Inorganic Aggregates for Use in Gypsum Plaster.

E. C 37, Specification for Gypsum Lath.

F. C 59, Specification for Gypsum Casting and Molding Plaster.

G. C 841, Specification for Installation of Interior Lathing and Furring.

H. C 842, Specification for Application of Interior Gypsum Plaster.

I. C 847, Specification for Metal Lath.

J. C 954, Specification for Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs from 0.33 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.

K. C 587, Specification for Gypsum Veneer Plaster.

L. C 1002, Specification for Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases.

M. C 1396, Specification for Gypsum Board (Gypsum Base for Veneer Plaster).

1.05 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures and in accordance with requirements of the Contract Documents.

B. Product Data: Manufacturers’ specifications and installation instructions for each product specified.

C. Shop Drawings: Show layout of control joints.

1.06 QUALITY ASSURANCE

A. Mock-Ups:

1. Lath and plaster an actual wall surface for each finish specified to show color, texture, and workmanship. Provide mock-ups of at least 100 sq. ft. Obtain the Architect's approval of mock- up locations.
2. Simulate finished lighting conditions for the Architect's review of mock-up.
3. Do not start plastering until mock-up is approved by the Architect. Provide additional mock-ups if necessary to obtain approval. Do not alter mock-ups until plastering is completed.

1.07 DELIVERY, STORAGE AND HANDLING

A. Packaging and Shipping: Have materials shipped in manufacturer's original packages showing manufacturer's name and product brand name.

B. Storage and Protection: Store materials inside and protected from damage by the elements. Protect ends, edges, and faces of gypsum lath from damage. Protect metal framing and accessories from bending.

1.08 PROJECT CONDITIONS

A. Environmental Requirements: Comply with ASTM C 842.

1.09 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner's Project Manager, Architect, and related subcontractors.

PART 2 - PRODUCTS

2.01 GYPSUM PLASTER

A. Provide gypsum plaster to comply with ASTM C 28 as manufactured by National Gypsum Company or equal. The base plaster shall be Gold Bond Two-Way Hardwall Plaster Gypsum Board. The finish plaster shall be Gold Bond Super- White Gauging Plaster Quick Set and Gold Bond Super-White Gauging Plaster Slow Set.

2.02 METAL LATH

A. Provide diamond mesh expanded metal lath with 5/16 in. wide diamonds, weighing 2.5 lbs. and 3.4 lbs. per sq. yd., galvanized or painted steel, and complying with ASTM C 847 as manufactured by National Gypsum Company or equal.

2.03 ACCESSORIES

A. Corner Bead: Formed steel nose with 2-1/2 in. expanded metal flanges, weighing 200 lbs. per 1000 lin. ft. with min. base steel of 0.0179 in., galvanized.

B. Casing Bead: J shaped steel bead with expanded metal flange for 1/2 in., 5/8 in. and 3/4 in. grounds, weighing 200 lbs., 210 lbs. and 220 lbs. per 1000 lin. ft., galvanized.

C. Expansion Joints: W shaped steel joint with expanded metal flanges for 1/2 in., 3/4 in. and 7/8 in. grounds, weighing 225 lbs. and 285 lbs. per 1000 lin. ft., galvanized.

D. Beam Furring Clip: Spring steel wire clip to fit beam flanges from 1/4 in. to 1 in. thick.

E. Tie Wire: Manufacturer's standard soft, annealed steel protected by Class 1 zinc coating and manufactured in accordance with ASTM A 641.

F. Fasteners:

1. Nails: As recommended by the manufacturer.
2. Screws: ASTM C 954 or ASTM C 1002 or both with heads, threads, points, and finish as recommended by the manufacturer.

2.04 MIXES

A. Proportions and Procedures: In accordance with ASTM C 842 and the manufacturer's recommendations.

PART 3 - EXECUTION

3.01 INSTALLATION

A. In accordance with the following ASTM Standards and manufacturer's recommendations:
   1. ASTM Standards:
      a. Metal Lath, Gypsum Lath, and Accessories: C 841.
      b. Gypsum Plaster: C 842.

B. Tolerances: For flatness of surface, do not exceed 1/4 in. in 8 ft. for bow or warp of surface and for plumb and level.

3.02 CLEANING

A. Remove plaster and protective materials from accessories and from adjacent surfaces

3.03 RUBBISH REMOVAL

A. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION

SECTION 09 30 00

TILING
(Filed Sub-Bid Required)

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 FILED SUB-BID REQUIREMENTS

A. The Work of this Section is stipulated as a Filed Sub-Bid under Paragraph D, Item 2 of the Form for General Bid.

B. The Sub-Bidder of this Section shall submit Section 00 03 25 – Form for Sub-Bid as required by Section 44F of Chapter 149 of the General Laws, as amended.

C. The Sub-Bidder of this Section is directed to Section 00 01 00 - Instructions to Bidders. All Sub-Bids shall be filed with the Awarding Authority in accordance with requirements stipulated therein.

D. The Sub-Bidder of this Section shall examine all drawings and specification sections for requirements affecting the Work of this Section as shown primarily in the following drawings:

1. Thorndyke Road Elementary School: A1.01 and A9.01.

E. The Sub-Bidder of this Section shall examine other drawings and specification sections that could affect the Work of this Section as it relates to coordination. The other drawings are the following:

1. Thorndyke Road Elementary School: D1.01 through D7.01; S0.01 through S2.01; FP1.01 through FP1.03; DP1.01 through P1.02; ED.0 through FA.3; H1.01 and H1.03; VT.02.

1.03 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:

1. Ceramic wall and floor tile with moisture mitigation
2. Glazed wall tile.
3. Porcelain floor tile with moisture mitigation
4. Concrete slab waterproofing
5. Trim, adhesives, grout, and all other accessories required for a complete installation

1.04 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
2. Section 02 41 13 - Selective Demolition
3. Section 03 54 13 - Cementitious Underlayment
4. Section 04 20 00 – Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.05 QUALITY ASSURANCE

A. Reference Standards:

1. American National Standards Institute (ANSI):
   a. A108.5:Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar
   b. A108.6: Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile Setting and Grouting Epoxy
   c. A118.4: Latex-Portland Cement Mortar Specifications
   d. A118.8: Modified Epoxy Emulsion Mortar/Grout
2. American Society for Testing and Materials (ASTM):
   a. C 144-99: Aggregate for Masonry Mortar
   b. C 150-99a: Portland Cement
   c. C 206-84: Finishing Hydrated Lime
   d. C 207-91: Hydrated Lime for Masonry Purposes
3. Tile Council of America, Inc. (ANSI):
   a. ANSI 137.1: Recommended Specifications for Ceramic Tile

B. For each type of tile required for the Work of this Section, provide products of one manufacturer. Provide mortar grout and adhesive materials which are acceptable to the approved tile manufacturers.

C. Before beginning primary Work of this Section, provide minimum 4 ft. x 4 ft. mock-ups of each type of tile Work and installation required under the Contract at locations acceptable to Architect and obtain Architect's acceptance of visual qualities and construction techniques. Protect and maintain acceptable mock-up throughout the Work of this Section to serve as criteria for acceptance of this Work. Approved mock-ups may be incorporated into the finished Work.

1.06 SUBMITTALS

A. Provide submittals in accordance with the requirements of Section 01 33 00 – Submittal Procedures.

B. Requirements, and in accordance with requirements of the Contract Documents.

C. Provide manufacturer's stock samples of wall and floor tile of the types specified, indicating full range of standard and premium colors for selection by the Architect.

D. Provide two, grouted, 24 in. x 24 in. panels for each selected color and type.

E. Provide manufacturer's product data for mortars, adhesives and grouts demonstrating that materials are suitable for intended use and meet or exceed standards of American National Standards Institute or another specified standard.

F. Provide m manufacturer's written instructions for use of mortars, adhesives, and grouts.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products in the approved manufacturer's original sealed containers with labels legible and intact, identifying brand name and contents.

B. Manufactured mortars and grouts shall contain hallmarks certifying compliance with reference standards and by types recommended by the approved tile manufacturer for the required application.

C. Adhesive containers shall be labeled with hallmarks certifying compliance with reference standards.

D. Deliver dry set mortar in sealed, moisture proof containers.

E. Store materials under cover in a manner to prevent damage or contamination.

1.08 PROJECT CONDITIONS

A. Perform Work only when conditions are within the limits established by manufacturers of the materials and products used. Comply with minimum temperature recommendations of manufacturers for bonding and grouting materials in other than Portland cement mortar. Maintain manufacturer's recommended curing/setting temperatures for at least 7 days after installation.

B. Proceed with Work only when substrate construction and penetrating Work is complete. The Tile Subcontractor shall examine substrates and conditions under which this Work is to be performed and notify the General Contractor, in writing, of conditions detrimental to the proper completion of the Work. Beginning Work means the Installer accepts substrates and conditions and shall be responsible for repair and replacement of defective or unacceptable Work.

C. Provide ventilation in accordance with the approved manufacturer's written requirements and the Contract Documents. Vent temporary heaters, if used, to prevent damage from carbon dioxide build-up.

1.09 EXTRA MATERIAL

A. Provide packaged, wrapped, and labeled maintenance stock equal to 5 percent of the actual quantity installed. Provide a minimum of three new, unopened, containers of each floor, wall, and quarry tile.

1.10 CUTTING AND CORING

A. The installation of new Work that requires cutting and coring of floors, walls, and roofs with dimensions 5-1/2 in. or less shall be performed by the Subcontractor of this Section. The General Contractor shall cut and core floors, walls, and roofs with dimensions not indicated by the Subcontractor of this Section.

1.11 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner's Project Manager, Architect, and related subcontractors.

PART 2 - PRODUCTS

2.01 TILE

A. All tile provided under the Work of this Section shall conform to requirements for ANSI A 137.1-1988, Specifications for Ceramic Tile, Standard Grade.

B. Type 1: Glazed Wall Tile

1.	Size:	4-1/4 in. x 4-1/4 in.
2.	Grout Joint:	1/16 in.
3.	Breaking Strength:	Greater than 100-230 lbs. per ASTM C648
4.	Water Absorption:	Less than 20 percent per ASTM C373
5.	Coefficient of Friction:	Greater than or equal to.5 (wet) and .8 (dry) per ASTM C1028
6.	MOH Scratch Hardness:	4.0 – 6.0
7.	Chemical Resistant:	Yes
8.	Locations:	See drawings for locations.
9.	Colors:	Provide tiles as selected by the Architect from the approved manufacturer's full range of standard and premium colors.

10. Acceptable Products:
    a. Dal Tile "Color Wheel Linear"
    b. American Olean "Color Story"
    c. Royal Mosa, "Global Collections"
    d. Johnson Tiles, "Prismatics"

C. Type 2: Porcelain Floor Tile and Base

1.	Size:	12 in x 12 in., unpolished
2.	Grout Joint:	1/8 in.
3.	Breaking Strength:	Greater than 450 lbs. per ASTM C648
4.	Water absorption:	Less than .5 percent per ASTM C373
5.	Coefficient of friction:	Greater than or equal to.6 (wet) and .7 (dry) per ASTM C1028
6.	MOH scratch hardness:	8.0 or greater
7.	Chemical resistant:	Yes
8.	Locations:	Lobby, Corridors, Toilet Rooms without showers,
9.	Colors:	Provide tiles as selected by the Architect from the approved manufacturer's full range of standard and premium colors.
10.	Recycled Content:	22.5 percent Pre-Consumer
11.	Shade Variation:	V3, high

12. Acceptable Products:
    a. Dal Tile "Chord"
    b. American Olean "Theoretical"
    c. Creative Materials "Cementing"
    d. CasalGrande Padana, "Basaltina"

2.02 WATERPROOFING MEMBRANE

A. Membrane Waterproofing shall be a thin, load bearing, flexible, fabric reinforced, liquid applied membrane, Laticrete Hydro Ban, or equal by Ardex or Mapei, complying with the following material and performance characteristics:

1. Hydrostatic Resistance shall be 120 psi in accordance with ASTM D 751
2. Water Vapor Transmission shall be 2.37 grains/ft^2 in accordance with ASTM E 96
3. Water Vapor Permeance shall be 2.88 perms in accordance with ASTM E 96
4. Elongation shall be 20-30 percent in accordance with ASTM D 751
5. Breaking Strength shall be 2400 psi in accordance with ASTM D 751
6. Shear Bond Strength shall be 250 psi in accordance with ANSI A118.10
7. Nominal Thickness shall be .020 in. in accordance with LIL 1013-92

2.03 SETTING MATERIALS

A. Provide dry-set mortar conforming to requirements of ANSI A118.1.

B. Provide mortar for thin-set beds conforming to ANSI A118.4, Laticrete 211 Crete Filler Powder, or equal by Hydroment or Mapei.

C. Provide latex additive Laticrete 4237 as manufactured by Laticrete, or equal by Hydroment or Mapei.

D. Provide factory prepared blend of high strength Portland Cement and graded aggregates, Laticrete 226 as manufactured by Laticrete, or equal by Hydroment or Mapei, for installation of thick bed mortar beds as called for on the Drawings. Provide Laticrete 3701 Grout and Mortar Admix as manufactured by Laticrete, or equal by Hydroment or Mapei.

E. Provide Type 1 Portland Cement complying with ASTM C 150

F. Provide sand complying with ASTM C 144

G. Provide tile reinforcing mesh, 2 in. x 2 in., 16/16 galvanized wire, complying with ASTM A 85

H. Provide 15 lb. roofing felt, or 4 mil polyethylene sheet cleavage membrane.

2.04 GROUTING MATERIALS

A. Provide stainless, chemical resistant, 100 percent solids, epoxy grout complying with ANSI 118.3, for ceramic tile at all floor and base locations at toilets, kitchen, dishwash, office, womens, mens, receiving, and storage areas. Epoxy grout shall be Latapoxy SP-100 as manufactured by Laticrete, or equal by Hydroment or Mapei. Grout shall be resistant to urine, acids and alkalis, petroleum distillates, oil solvents and food wastes and shall meet or exceed the following requirements:

1. Compressive Strength shall be greater than 6,600 psi in accordance with ASTM C 109 Modified
2. Shear Bond Strength shall be greater than 1,000 psi in accordance with ANSI A118.3
3. Water Absorption shall be less than 1/2 percent in accordance with ANSI A118.4
4. Tensile Strength shall be 1,700 psi in accordance with ANSI A118.4
5. Water cleanability shall be less than 80 min. in accordance with ANSI A118.3
6. Workability at 72 deg. F shall be 1 hour.
7. Installation temperature range shall be 60 deg. F to 90 deg. F.

B. Provide factory prepared, polymer fortified, sanded grout, Laticrete Series 1500, or equal by Hydroment or Mapei, for all horizontal surfaces other than Toilets, in accordance with the approved manufacturer's written requirements.

C. Provide factory prepared, polymer fortified, non-sanded grout, Laticrete Series 1600, or equal by Hydroment or Mapei, for all vertical surfaces in accordance with the approved manufacturer's written requirements.

D. Color of all floor and wall grout shall be as selected by the Architect from the approved manufacturer’s complete selection of standard and premium colors.

2.05 SEALANTS

A. Provide the approved manufacturer’s sealant at horizontal locations of all unglazed tile and non-epoxy grout.

2.06 ACCESSORIES

A. Provide white marble thresholds at unglazed mosaic floor tile to adjacent finish. The ends of thresholds shall be notched to match the profile of hollow metal door frame.

B. Provide accessory trim pieces as indicated on the Drawing, including but not limited to, the following:

1. Satin anodized aluminum outside corners and top caps and transition between ceramic tile and terrazzo and ceramic tile and resilient base locations, Quadec, as manufactured by Shluter or equal.

2. Satin anodized aluminum tile transition profiles, Schiene, Reno-TK, Reno-U and Reno-ramp as manufactured by Schuler or equal.

2.07 MOISTURE MITIGATION

A. Provide written confirmation from approved resilient flooring manufacturer that specified moisture mitigation systems are compatible with flooring adhesives and approved by the flooring manufacturers to indicate specified moisture mitigation system complies with the requirements of this Section.

B. The moisture vapor control system shall be alkali-resistant, two-component, 100 percent solids epoxy resin, ASTM F3010-13, Mapei Planiseal PMB as manufactured by MAPEI or equal by Koster or Vexcon. The moisture vapor control system shall comply with the following characteristics:

3. VOC:	3 g per L (Rule 1168 of California's SCAQMD)
4. Permeability:	less than 0.1 perm at greater than 10 mils DFT per ASTM E96-05
5. Reduction of Moisture Vapor:	greater than 96 percent per ASTM E96-05
6. Pull-of Adhesion/Bond Strength:	greater than 1,000 psi with failure in concrete substrate (at 28 days per ASTM D7234)
7. Resistance to high alkalinity (ph14):	14-day spot test, covered – no effect.
8. 14-day spot test, uncovered – no effect	
9. 14-day immersion – no effect	

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine surfaces to receive ceramic tile, setting bed, or accessories before commencing tile installation for defects or conditions adversely affecting quality and execution of tile installation. Substrate deviations or adverse conditions exceeding the approved manufacturer's requirements shall be corrected prior to commencing tile installation. Do not proceed with installation Work until unsatisfactory conditions are correct. Proceeding with installation shall indicate to the Tile Subcontractor acceptance of satisfactory conditions and responsibility for Work in accordance with the Contract Documents. Maximum allowable tolerance of surfaces to receive tile shall be as follows:

1. Dry-Set and Latex-Portland Cement Mortar Methods:
   a. Maximum variation in sub-floor surface: 1/8 in.
   b. Maximum variation in vertical surfaces: 1/8 in.
2. Modified Epoxy Mortars and Dry-Set and Latex-Portland Cement Mortar, Methods:
   a. Maximum variation in sub-floor surface: 1/8 in. in 10 ft.
   b. Maximum variation in vertical surfaces: 1/8 in. in 8 ft.

B. Surfaces to receive tile shall be firm, dry, clean, and free of oily or waxy films. Grounds, anchors, plugs, hangars, bucks, electrical and mechanical Work in or behind tile shall be installed prior to proceeding with the Work of this Section.

3.02 INSTALLATION

A. Strictly comply with the approved manufacturer's written instructions, except where more restrictive requirements are specified in this Section.

B. Lay tile in grid pattern with floor, base and wall joints accurately aligned. Center tile in both directions to avoid use of less than 1/2 tile units, unless otherwise indicated on the Drawings.
   1. Extend tile Work into recesses and under and behind fixtures.
   2. Terminate Work neatly at obstructions, edges, and corners without disrupting pattern or joint alignment.
   3. Cut and drill tile without damaging decorative surfaces. Fit tile closely to fixtures, piping and other Work.
   4. For tile placed in sheets, make joints between sheets the same width as joints within sheets.
   5. Layout wall tile to next full tile beyond dimension indicated. Extend wall tile at least 3 in. above suspended acoustical ceilings unless a wainscot is indicated.

C. Comply with requirements of Tile Council of America *Handbook for Ceramic Tile Installation* and ANSI 108 series *Standard Specifications for the Installation of Ceramic Tile*. Provide complete installations including expansion joints as recommended by these standards even if not shown or otherwise indicated on the Drawings. Install tile in accordance with requirements of the following referenced standards:
   1. Walls: TCA W 243-2K for metal studs, TCA W 202-2K for masonry, and TCA W 244-2K for cementitous backer units, water resistant Portland cement mortar and latex modified grout at Kitchen and Toilets.
   2. Provide Mudset Floors and Thresholds at all locations of depressed concrete slabs as indicated on the Drawings. Mudset shall comply with the most recent TCA F 114-2K requirements for Latex modified Portland cement mortar, bond coat and epoxy grout. Provide cleavage membrane and wire mesh reinforcing at all areas to receive tile located on the second floor, in accordance with requirements of the TCA handbook.
   3. Provide waterproof membrane in accordance with TCA F121-2K. Waterproofing membrane shall be applied to all substrates of areas to receive floor or wall tile in rooms or other spaces located above occupied rooms or spaces below. Membrane shall be installed in accordance with the approved manufacturer’s written requirements.

D. Mix and install grout in strict compliance with the approved manufacturer's written instructions. Protect Work from foot traffic for at least seven days after grouting.

E. Provide crack control joints and/or expansion joints at locations as described below. Crack control joints and expansion joints shall be filled with sealant under the Work of, and in accordance with requirements of, Section 07 92 00 – Joint Sealants.
   1. Inside vertical corners: Crack control joints matching width of standard grout joints.
   2. Overall cracks and joints in concrete sub-floors: Minimum 1/4 in. expansion joint.
   3. Overall changes in backing materials: Minimum 1/4 in. expansion joint.
   4. Interior Not Exposed to Direct Sunlight

or Standing Water:	Minimum 1/4 in. expansion joint at 24 ft. maximum on center in each direction.
5. Interior Exposed to Direct Sunlight or Standing Water:	Minimum 1/4 in. expansion joint at 12 ft. maximum on center in each direction.

F. Where tile abuts an adjacent restraining surface, including but not limited to, perimeter walls, columns, ceilings, dissimilar floors, and all similar conditions Minimum 1/4 in. expansion joint.

G. Apply the approved manufacturer's recommended sealant to all horizontal surfaces of unglazed ceramic and porcelain floor tile, and non-epoxy grout, in accordance with the approved manufacturer's written requirements.

3.03 REPAIR, CLEANING AND PROTECTION

A. Repair minor damage to all Work of this Section, including coatings and finishes, to eliminate all evidence of repair. Remove and replace Work which cannot be satisfactorily repaired, as determined by the Architect. Leave Work free of broken, chipped, and loose tile.

B. Clean exposed surfaces using materials and methods recommended by manufacturer of tile being cleaned. Remove and replace Work that cannot be successfully cleaned. Do not use acid cleaners unless specifically permitted by tile manufacturer and only after completely curing tile and grout. Protect adjacent surfaces from contact with acid cleaners and thoroughly flush with clean water.

C. Provide temporary protection to ensure completed Work is without damage or deterioration at time of final acceptance. Remove protections and re-clean as necessary immediately before final acceptance.

3.04 RUBBISH REMOVAL

A. The Subcontractor of this Section shall stockpile and drop daily all wastes and debris at areas designated by the General Contractor.

B. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION

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SECTION 09 51 13

ACOUSTICAL PANEL CEILINGS
(Filed Sub-Bid Required)

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 FILED SUB-BID REQUIREMENTS

A. The Work of this Section is stipulated as a Filed Sub-Bid under Paragraph D, Item 2 of the Form for General Bid.

B. The Sub-Bidder of this Section shall submit Section 00 03 25 – Form for Sub-Bid as required by Section 44F of Chapter 149 of the General Laws, as amended.

C. The Sub-Bidder of this Section is directed to Section 00 01 00 - Instructions to Bidders. All Sub-Bids shall be filed with the Awarding Authority in accordance with requirements stipulated therein.

D. The Sub-Bidder of this Section shall examine all drawings and specification sections for requirements affecting the Work of this Section as shown primarily in the following drawings:

1. Lincoln Elementary School: A1.01 through A12.01.

E. The Sub-Bidder of this Section shall examine other drawings and specification sections that could affect the Work of this Section as it relates to coordination. The other drawings are the following:

1. Lincoln Elementary School: D1.01 through D7.01; S0.01 through S1.02; FP1.01 through FP1.03; DP1.01 and P1.01; ED.1 through FA.2; DH1.01 and H1.01; VT.01.

1.03 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:

1. Acoustic ceiling panels
2. Suspension System
3. Accessory components

1.04 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.

2. Section 02 41 13 - Selective Demolition
3. Section 03 54 13 - Cementitious Underlayment
4. Section 04 20 00 – Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.05 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures and in accordance with requirements of the Contract Documents.

B. Provide manufacturer product data for each product indicated.

C. Provide product samples as follows:

1. 6 in. x 6 in. for each color and texture of acoustical tile
2. 12 in. long for each suspension system member and each exposed molding and trim

D. Provide manufacturer product test reports demonstrating compliance with specified requirements.

E. Provide manufacturer research and evaluation reports demonstrating compliance with specified requirements.

F. Provide manufacturer maintenance data.

1.06 QUALITY ASSURANCE

A. Tolerances:

1. Deflection:
   a. Maximum deflection shall be 1/360 of the span in accordance with ASTM C 635.
   b. The finished ceiling system shall be level within 1/8 in. in 12 ft.

B. Fire-Test-Response Characteristics:

1. Provide acoustical tile ceiling assemblies identical to those of assemblies tested for compliance with fire resistance ratings in accordance with ASTM E119 by an independent testing agency acceptable to authorities having jurisdiction.

a. Materials shall be identified with appropriate markings from the applicable testing and inspecting agency.
b. Acoustical tiles shall be Class A, when tested in accordance with ASTM E1264

C. Seismic Standard:

1. Acoustical tile ceiling assemblies shall be installed in accordance with ASTM E580-96 and as otherwise required by local authorities having jurisdiction.

D. Before beginning primary Work of this Section, provide minimum 100 square foot mock-ups of each ceiling system specified at locations acceptable to Architect and obtain Architect's acceptance of visual qualities. Protect and maintain acceptable mock-ups throughout the Work of this Section to serve as criteria for acceptance of this Work. Acceptable mock-ups may be incorporated into the finished Work.

1.07 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Provide quantity of full-size units equal to five percent of quantity installed, but not less than three new, unopened boxes for each color and texture of acoustical tile ceiling.
2. Provide the following quantity of each concealed grid and exposed component:
   a. Main Tees: 25 pieces
   b. Cross Tees: 150 pieces
   c. Wall Molding: 50 pieces

1.08 CUTTING AND CORING

A. The installation of new Work that requires cutting and coring of floors, walls, and roofs with dimensions 5-1/2 in. or less shall be performed by the Subcontractor of this Section. The General Contractor shall cut and core floors, walls, and roofs with dimensions not indicated by the Subcontractor of this Section.

1.09 SCAFFOLDING AND EQUIPMENT

A. The Subcontractor of this Section shall provide, maintain, and safely remove when no longer required, interior and exterior staging, scaffolding, hoists, and all other related equipment to comply with all applicable Federal, State, and local regulations and codes.

1.10 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner’s Project Manager, Architect, and related subcontractors.

PART 2 - PRODUCTS

2.01 GENERAL

A. Acoustical ceiling tile and acoustical ceiling suspension systems shall be products of the same manufacturer.

B. Acoustical ceiling tile and acoustical ceiling suspension systems shall comply with the following minimum test requirements:

1. ASTM E1264; Standard Test Method for Sound Absorption and Sound Attenuation by the Reverberation Room Method
2. ASTM C635; Standard Specification for Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings
3. ASTM C423; Standard Test Method for Sound Absorption by Reverberation Room Method
4. ASTM E1414; Standard Test Method for Airborne Sound Attenuation Between Rooms
5. ASTM E1111; Standard Test Method for Measuring the Attenuation of Open Office
6. ASTM E1477; Standard Test Method for Luminous Reflectance Factor of Acoustical Materials
7. ASTM D3273; Standard Test Method for Resistance to Growth of Mold on Surface of Interior Coatings

C. Attachment devices shall be sized for five times the design load indicated in ASTM C635, Table 1, in Direct Hung – Intermediate Duty, in. unless otherwise indicated.

1. Anchors in concrete shall be fabricated from corrosion-resistant materials with the capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E488.

D. Hanger wire shall be 12 GA, zinc-coated carbon-steel wire, soft temper, pre-stretched, in accordance with requirements of ASTM A 641.

E. Seismic struts and clips shall be the approved manufacturer’s standard struts and clips in compliance with the requirements of this specification.

F. Metal edge moldings and trim shall be the approved manufacturer's standard moldings for edges and penetrations required to fit specified acoustical tile edge details and suspension systems. Components shall be formed from sheet metal of the same material and finish as that used for exposed flanges of suspension system runners. Provide radiused corner trim at all corner locations where suspension grid abuts bullnose CMU.

2.02 ACOUSTICAL CEILING TYPES

A. Type 1.1a:

1. Size: 24 in. x 24 in. x 3/4 in.
2. Grid Face: 9/16 in., White
3. Edge Profile: beveled or angled tegular
4. Perimeter Trim: shadow molding, white
5. Surface Texture: fine
6. Surface Finish: factory applied latex paint.
7. ASTM E1264: Type IV, Form 2, Pattern E
8. Content: Mineral Fiber

9. NRC Range: .70 min.
10. CAC: 35 min.
11. Light Reflectance: .85 min.
12. Recycled Content: 70 percent min.
13. Color: White
14. Sag Resistant yes
15. Antimicrobial yes
16. Acceptable Products:
    a. Armstrong Ultima No.1912
    b. USG Mars Clima Plus No. 86985
    c. Certainteed Symphony 1222F–RXS-1
    d. or equal

B. Type 1.1b: Same as 1.1a with the following exceptions:
1. Size: 24 in. x 48 in. x 3/4 in.
2. Acceptable Products:
    a. Armstrong Ultima No. 1915
    b. USG Mars Clima Plus No. 88985
    c. Certainteed 1220F–RXS-1
    d. or equal

2.03 ACOUSTIC TILE SUSPENSION SYSTEMS AND TRANSITIONS

A. Suspension components shall be as provided by the approved acoustic tile ceiling manufacturer, compatible with the specified acoustic tile, and required to provide a 30-year full system warranty by the approved manufacturer.
1. Provide 9/16 in. Suprafine XL Exposed Tee Systems, complete with main tee's, cross tee's, as manufactured by Armstrong, Donn Centricitee DXT by USG, or equal by Certainteed.
2. Provide 9/16 in. with 1/4 in. reveal, Suprafine Shadow molding #7874, as manufactured by Armstrong, or equal by USG or Certainteed.
3. Provide 15/16 in. Prelude XL Exposed Tee System, complete with main tee's, cross tee's, as manufactured by Armstrong, Donn DX/DXL by USG, or equal by Certainteed.
4. Provide hold down clips at all vestibules and, in accordance with requirements of the approved manufacturer's written requirements.
5. Provide Axiom Classic 6 in. AX6STR, and all necessary clips, as manufactured by Armstrong, or equal by USG or Certainteed
6. Recycled Content: 30 percent Pre-Consumer

B. Hanger wires shall be 7/64 inch in diameter with a load rating of 275 lbs., Model No. 7891 as manufactured by Armstrong or equal by Suspend-It.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install acoustical tile ceilings and exposed tee suspension system in accordance with the approved manufacturer's written instructions and requirements of the Contract Documents.

B. The Ceiling Subcontractor shall measure each ceiling area and establish layout of acoustical tiles to establish equal width border units at opposite edges of each ceiling. Use of less-than-half-width tiles at borders shall be reason for rejection. At 2 ft. x 2 ft. perimeters, the Ceiling Subcontractor shall provide filed cut 2 ft. x 4 ft. panel to avoid slivers smaller than 6 in. At 2 ft. x 4 ft. perimeters, the Ceiling Subcontractor to provide filed cut 2 ft. x 5 ft. panel to avoid slivers smaller than 6 in.

C. Hangers:

1. Provide maximum spacing of 4 ft. on center in each direction and 6 in. from each end of main runners.
2. Provide one wire hanger at each corner of recessed light fixtures.
3. Hanger wire shall not be splayed more than 4 in. in 4 ft. vertical drop.
4. Wrap each end of hanger wire around itself a minimum of three times.

D. Edge moldings and trim:

1. Install at all intersections of acoustical tile ceiling and vertical surfaces.
2. Screw edge molding to substrate with concealed fasteners at intervals not more than 16 in. O.C. and not more than 3 in. from ends.
3. Miter corners accurately and connect securely with color matched rivets. Install suspension system runners so they are square and securely interlocked with one another.
4. Remove and replace dented, bent, or kinked members.

E. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Scribe and cut tile, including dado cut at cut edges of tegular tile, for accurate fit at borders and around penetrations through tile. Install tiles with pattern running in one direction. Replace all damaged or discolored tiles directed by Architect and/or Owner.

3.02 REPAIR, CLEANING AND PROTECTION

A. Repair minor damage to eliminate all evidence of repair. Remove and replace Work which cannot be satisfactorily repaired. Leave Work free of broken, cracked, or otherwise damaged tiles.

B. Remove and legally dispose off-site daily, all rubbish and debris caused by the Work of this Section.

C. Broom and clean all areas.

D. Provide temporary protection to ensure new Work is conveyed to Owner without damage or deterioration at time of final acceptance.

3.03 RUBBISH REMOVAL

A. The Subcontractor of this Section shall stockpile and drop daily all wastes and debris at areas designated by the General Contractor.

B. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 50 00 - Temporary Facilities and Controls.

END OF SECTION

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SECTION 09 64 00

WOOD FLOORING

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, the following:

1. Subfloor preparation, including moisture and Ph level testing of concrete substrate.
2. Wood flooring.
3. MDO strip flooring.
4. Vapor barrier
5. Field sanding and finishing of wood strip flooring including game lines.
6. Vented cove base at flooring perimeter.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
2. Section 02 41 13 - Selective Demolition
3. Section 03 54 13 - Cementitious Underlayment
4. Section 04 20 00 – Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm

19. Section 31 20 00 – Earth Moving

1.04 QUALITY ASSURANCE

A. The installer shall have a minimum of at least three years' experience in Work of the type required by this Section and shall be acceptable to the approved wood flooring manufacturer. Provide a list of at least three completed projects of similar scope and magnitude completed within the last two years.

B. Provide primary materials which are the products of one manufacturer for each type of material required for the Work of this Section. Provide secondary materials acceptable to the approved wood flooring manufacturer.

C. Strictly comply with the recommendations of the Maple Flooring Manufacturer's Association (MFMA), for materials, installation and finishing procedures of maple flooring and National Oak Flooring Manufacturer's Association for oak flooring.

D. Before beginning primary Work of this Section, provide minimum 100 square foot mock-ups of each floor system specified at locations acceptable to Architect and obtain Architect's acceptance of visual qualities. Protect and maintain acceptable mock-ups throughout the Work of this Section to serve as criteria for acceptance of this Work. Acceptable mock-ups may be incorporated into the finished Work.

E. The Wood Flooring Installer shall pay for testing to be performed by an independent agency and a minimum of ten in-place Hygrometer Probe Tests in accordance with the requirements of ASTM F 2170. Results of tests shall demonstrate a Relative Humidity of less than 75 percent within concrete slabs-on-grade and above grade. Results of tests shall be provided to the Owner prior to commencing the Work of this Section. Failure by the Wood Flooring Installer to provide the required testing, maintain specified level of relative humidity, and subsequent failure of areas of wood flooring shall not be cause for additional cost to Owner for repair or replacement of areas of failed flooring.

1.05 TEST

A. Provide wood flooring materials whose surface burning characteristics are classified as Class A or B, when tested in compliance with ASTM E 84.

1.06 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures and in accordance with requirements of the Contract Documents.

B. Provide manufacturer's product data, installation instructions, use limitations and recommendations for flooring products, including certification of compliance with specified requirements.

C. Provide two 1 ft. wide by 2 ft. long, sanded and finished representative samples of wood flooring material showing the full range of color and finish variations expected.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver wood flooring materials and products in unopened factory labeled packages. Store and handle in strict compliance with the approved manufacturer's written instructions. Protect from all possible damage and excessive moisture. Maintain temperature and relative humidity levels of 65°F to 75°F and 35 percent to 50 percent respectively.

1.08 PROJECT CONDITIONS

A. Perform installation Work only when environmental conditions similar to those planned for the permanent occupancy are established and maintained. Open sealed cartons and condition wood flooring materials to the environment for at least 5 days prior to installation to acclimatize materials thoroughly before installation. Follow the approved wood flooring manufacturer's written guidelines.

B. Proceed with Work only when adjacent construction and finishing Work is complete.

C. Comply with the approved manufacturer's written requirements for ventilation, except where more stringent Contract Document requirements apply.

1.09 EXTRA MATERIAL

A. Provide packaged, wrapped, and labeled maintenance stock from the same factory production lot equal to 5 percent of the actual quantity of wood flooring materials installed.

1.10 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner’s Project Manager, Architect, and related subcontractors.

1.11 FLAME SPREAD AND SMOKE DEVELOPED LIMITATIONS

A. Interior finish materials shall be classified in accordance with ASTM E 84 or UL 723. Such interior finish materials shall be grouped in the following classes in accordance with their flame spread and smoke-developed indexes.

1. Class B: Flame spread index 26-75; smoke- developed index 0-450.

PART 2 - PRODUCTS

2.01 WOOD FLOORING

A. Provide a floating wood floor system, NeoShok Floating System as manufactured by Connor Sports Flooring, or Architect approve equal by ProAction Thrust by Action Floor Systems, Horner Flooring Co., Robbins, Inc., Aacer Flooring LLC. Wood floor system shall incorporate the following material and performance characteristics:

1. Fiberglass reinforced mold and fungus resistant fabric membrane with polymer film coating on bottom surface and mineral faced top surface, with a perm rating of less than 0.04 in accordance with ASTM E96.
2. Hemispherical, two-stage, 3/4 in. thick red polyurethane, with 70D durometer, as manufactured by Connor Sports Flooring, or equal.
3. The subfloor shall be two layers of 15/32 in. thick, 4 ft. x 8 ft. APA rated sheathing, Exposure 1, CD-X, fir, or southern pine plywood.
   a. Subfloor fasteners shall be 1 in. length, 7/16 in. crown, coated staples or equal.
   b. Construction adhesive shall be PL400 or equal.
4. The flooring shall be 25/32 in. thick x 2-1/4 in. wide, 2nd Grade and Better, manufactured in accordance with MFMA-FJ rules, T&G and EM, KD Northern Hard Maple, as supplied by the approved Athletic Wood Flooring manufacturer, or equal.
   a. Flooring fasteners shall be 1-1/2 in., 20-gauge staples.
5. The perimeter base shall be 3 in. X 4 in., heavy duty, molded, black, vented cove base with pre-molded outside corners.
6. Floor finishing materials shall be oil modified polyurethane sealer and finish, as manufactured by Robbins, or equal.

2.02 MDO FLOORING

A. Provide 3/4 in. thick, medium density overlay (MDO), consisting of 1/2 in. AC Grade plywood with 1/4 in. tempered masonite hardboard overlay.
   1. Rear platform plywood underlayment shall be Grade AC, 3/4 in. thick.
   2. The final surface of rear platform shall be 1/4 in. tempered masonite hardboard, painted black.

2.03 VAPOR BARRIER

A. Provide 37 mil thick, fiberglass reinforced fabric membrane, VersaShield, as manufactured by ELK Building Products, or equal, with polymer film coating on bottom surface and mineral faced top surface. Material shall be mold and fungus resistant, with a perm rating of less than 0.04 in accordance with ASTM E96 and suppress moisture vapor transmissions of 12 lbs per 1,000 sq. ft. per 24 hours. Provide the approved manufacturer's required sealing tape for all joints.

2.04 MISCELLANEOUS MATERIALS

A. Provide miscellaneous wood trim, saddles, nosings, and other items required to provide a complete Stage wood flooring system in accordance with requirements of the Contract Documents. Wood trim and accessories shall match wood flooring in species and grade.

B. Provide solvent based, VOC compliant, gym line paint, as manufactured by Hillyard, or equal by the approved gym floor finish manufacturer. A minimum of six colors shall be selected by the Architect from the approved manufacturer's complete selection of standard colors.

C. Wood Sanding Sealer shall be 550 Seal II, as manufactured by Hillyard, or equal by Essential Industries or DuraSeal. Sanding sealer shall comply with the following material and performance requirements:
   1. VOC Level: Less than 550 grams/liter

2. Resin Type: Oil Modified Urethane
3. Solids Content: 37 percent
4. Coverage Rate: 350 to 500 sq. ft./gallon
5. Drying Time: 12 hours

D. Wood Finish: Fast Dry 450 Gym Finish II, as manufactured by Hillyard, or equal by Essential Industries or DuraSeal. Finish shall comply with the following material and performance requirements:

1. VOC Level: Less than 450 grams/liter
2. Resin Type: Oil Modified Urethane
3. Solids Content: 50 percent
4. Coverage Rate: 500 to 600 sq. ft./gallon
5. Drying Time: 12 hours
6. Durability: Very Good

PART 3 - EXECUTION

3.01 PREPARATION

A. Proceed with Work only when substrate construction and penetrating Work is complete. The Wood Floor Installer shall examine substrates and conditions under which this Work is to be performed and notify General Contractor, in writing, of conditions detrimental to the proper completion of the Work. Beginning Work means the Installer accepts substrates and conditions and shall be responsible for repair and replacement of defective or unacceptable Work.

B. Concrete surfaces to receive wood flooring shall be thoroughly cleaned and vacuumed to ensure all surfaces are free from dust, soil, oil, grease, wax, or any other foreign matter before the start of Work. Where necessary the Wood Flooring Installer shall sweep, vacuum, damp mop, and neutralize the area after which the area shall be dried.

C. Cracks, grooves, small holes, and depressions up to 3/8 in. deep and 6 in. in diameter shall be filled and leveled with an approved cementitious underlayment. Ridges and other protrusions in concrete shall be ground smooth and surfaces brushed clean. Floor substrate shall be leveled to 1/8 in. in 10 ft. Underlayment shall be fully cured prior to installation of flooring system. Refer to Section 03 54 13 – Cementitious Underlayment for materials and installation procedures.

3.02 INSTALLATION

A. Strictly comply with the approved manufacturer's written instructions, except where more restrictive requirements are specified in this Section. Strictly comply with the recommendations of referenced Association Standards.

B. Test and prepare substrates in accordance with the approved flooring manufacturers’ written instructions and referenced Association Standards, except where more restrictive requirements are specified in this Section. Install continuous vapor barrier with joints overlapped a minimum 6 in., and a minimum 2 in. lapped up all perimeter walls. All joints shall be taped.

C. Installation of Wood Flooring:

1. Wood flooring shall be tested prior to installation at a minimum of 30 locations to establish an average moisture content required to ascertain intervals of expansion spaces within the floor system.
2. Expansion spacers shall consist of a piece of non-corrosive metal measuring 1/16 in. thick x 2 in. x 2 in. Expansion spacers shall be inserted along the entire length of a row, approximately 6 to 12in. apart. Frequency and number of expansion space intervals shall be determined in accordance with the approved manufacturer's written instructions, wood moisture content, and prevailing environmental conditions. The spacers shall be placed on the top surface of the flooring tongue and the succeeding flooring board shall be driven tight against them. Spacers shall remain in place until the next expansion interval is reached. Spacers shall be removed, and the same operation repeated at each expansion interval.
3. The wood flooring installation shall begin at the center of the room parallel to the intended direction of the finished wood flooring. The center starter row shall be a double-tongued starter row starter board, nailed with 2in. barbed cleats in both directions to prevent tipping. Each succeeding row of boards shall install by blind nailing with 2in. barbed cleats, starting at an end wall and continuing across the field of the wood flooring to the opposite end wall.
4. Wood flooring within proximity of an adjacent wall, where use of an automatic nailer is not possible, shall be hand nailed using 6d or 8d coated finish nails at 12 in. O.C. Place flooring in position and draw it up tightly by carefully prying against the adjacent wall, exercising care to not damage areas of the wood flooring to be exposed. Pre-drill all holes at locations of hand nailing.
5. Remove all excess material and miscellaneous debris from the area and the floor system. Sweep the entire area of installed wood flooring in preparation for sanding operation.

3.03 FIELD FINISHING AND FINISHING OF FLOOR SYSTEMS

A. Wood flooring shall be machine sanded to level floors and to remove ridges, cups, and other surface imperfections in accordance with the approved flooring manufacturers written instructions and referenced Association Standards, except where more restrictive requirements are specified in this Section.

1. Sanding process shall be as follows:
   a. First traverse shall be across the grain using No. 2 sandpaper.
   b. The second traverse shall be with the grain using No. 1/2 sandpaper.
   c. The third traverse shall be with the grain using No. 0 or No. 00 sandpaper.
2. Floors shall have final buffing with 100 grit screens back or equal grit sandpaper, with heavy-duty buffing machine.
3. Wood flooring shall be finished immediately after sanding. The floor shall be cleaned by vacuum or tack cloth prior to application of the first coat of sealer. Do not walk directly on sanded floors; use heavy protection paper.

B. Apply one coat of sealer and three finish coats of polyurethane in strict compliance with the approved finish materials manufacturer's written instructions and referenced Association Standards, except where more restrictive requirements are specified in this Section. After completely drying, each coat of sealer and finish shall be screened, and cleaned by vacuum or tack cloth, prior to application of the next coat.

C. The finished surface of MDO flooring at rear stage shall be painted with three coats of flat black floor paint under the Work of this Section. Paint shall be as manufactured by Benjamin-Moore, or equal by California Paints or Sherwin-Shalliams, and installed as follows:
   1. One Coat - Ultra Spec® 500 Interior Latex Primer No. N534
   2. Two Coats - Ultra Spec® 500 Interior Flat Finish No. N536

D. Perimeter Molding:
   1. All base moldings shall be anchored to the surrounding wall construction. Install vented type base around the entire perimeter of Platform floor. Use pre-molded outside corners and neatly mitered inside corners.
   2. All thresholds shall overlap the top of the floor and not butt against the floor system. Thresholds shall be attached to adjacent floors.

3.04 CLEANING, TOUCH-UP, AND PROTECTION

A. Touch up damaged coatings and finishes and repair minor damage to eliminate all evidence of repair. Clean and buff exposed surfaces using non-abrasive materials and methods recommended by flooring manufacturer. Remove and replace Work that cannot be successfully cleaned or repaired.

B. Provide temporary protection to ensure Work being without damage or deterioration at time of final acceptance. Remove protections and reclean as necessary immediately before final acceptance.

3.05 RUBBISH REMOVAL

A. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 50 00 – Temporary Facilities and Controls.

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SECTION 09 65 13

RESILIENT BASE AND ACCESSORIES

(Part of the Work of Section 09 65 16 – Resilient Flooring, Filed Sub-Bid Required)

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 FILED SUB-BID REQUIREMENTS

A. The Work of this Section shall be included as Part of the Work of Section 04 20 00 – Unit Masonry, stipulated as a Filed Sub-Bid under Paragraph D, Item 2 of the Form for General Bid.

B. The Sub-Bidder of Section 09 65 16 – Resilient Flooring shall examine all Drawings and all Sections for requirements affecting the Work of this Section as shown primarily in the following drawings:

1. Lincoln Elementary School: A1.01 through A12.01.
2. Thorndyke Road Elementary School: A1.01 and A9.01.

C. The Sub-Bidder of Section 09 65 16 – Resilient Flooring shall examine other drawings and specification sections that could affect the Work of this Section as it relates to coordination. The other drawings are the following:

1. Lincoln Elementary School: D1.01 through D7.01; S0.01 through S1.02; FP1.01 through FP1.03; DP1.01 and P1.01; ED.1 through FA.2; DH1.01 and H1.01; VT.01.
2. Thorndyke Road Elementary School: D1.01 through D7.01; S0.01 through S2.01; FP1.01 through FP1.03; DP1.01 through P1.02; ED.0 through FA.3; H1.01 and H1.03; VT.02.

1.03 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:

1. Resilient base
2. Transition and reducer strips
3. Adhesives

1.04 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following Divisions:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
2. Section 02 41 13 - Selective Demolition

3. Section 03 54 13 - Cementitious Underlayment
4. Section 04 20 00 – Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.05 QUALITY ASSURANCE

A. Provide each type of resilient flooring and accessories as produced by a single manufacturer, including recommended primers, adhesives, sealants, and leveling compounds. Manufacturers of resilient flooring materials shall have a minimum of 10 years in the production and sale of types of flooring materials required for this project and be able to reference successful projects of similar magnitude and scope.

B. The installer shall employ personnel certified and trained by the approved manufacturer, with technical qualifications and facilities required to complete the Work of this Section in accordance with the Contract Documents.

1.06 TEST

A. Provide resilient flooring having the following Fire Performance properties:

1. Critical Radiant Flux: ASTM E648, 0.45 watts/cm2 or greater.
2. Flame Spread: ASTM E84, 75 or less.
3. NBS Smoke: ASTM E662, 450 or less.

B. The Resilient Flooring Subcontractor shall provide testing of substrates to receive resilient floor tile necessary to comply with the approved manufacturer’s minimum moisture and Ph level requirements. Testing should be conducted in accordance with requirements of ASTM F 2170 for determining relative humidity in concrete slabs using in situ probes.

1.07 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures and in accordance with requirements of the Contract Documents.

B. Submit a complete line of manufacturer's standard and premium samples showing the complete range of colors, textures, and finishes available for each material used.

C. Submit three full-size samples of each material that is to be used in the finished Work having a minimum area of 144 square inches. Provide 6 in. lengths of base and trim pieces.

1.08 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products to project site in the approved manufacturer's original, unopened containers with labels indicating brand names, colors, patterns, and quality designations, legible and intact. Store and handle in strict compliance with the approved manufacturer's written instructions. Protect from damage.

B. Store flooring, adhesives, and accessories in original containers at not less than 70 deg. F for not less than 48 hours immediately prior to installation.

1.09 PROJECT CONDITIONS, SEQUENCING AND SCHEDULING

A. Maintain a minimum temperature of 60 deg. F and a maximum temperature of 75 deg. F in the spaces to receive flooring and accessories for a minimum of 48 hours before, during, and after installation. Thereafter, maintain a minimum temperature of 55 deg. F (13 deg. C) in areas where Work has been completed. Protect all materials from the direct flow of heat from hot-air registers, radiators, or other heating fixtures and appliances.

B. Proceed with Work only when substrate construction and penetrating Work is complete. Perform the Work of this Section after other finishing operations, including painting, have been completed.

C. Comply with the approved manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting installation of the Work of this Section. Evaluate slab condition, including slab moisture and pH content and extent of repairs required, if any. Concrete to receive resilient flooring shall have cured for at least 28 days and be free of all curing compounds. Test concrete substrate to determine acceptable moisture levels prior to installation. Testing should be conducted in accordance with requirements of ASTM F 2170 for determining relative humidity in concrete slabs using in situ probes. Coordinate Work of this Section with Work of Section 03 30 00 – Cast-in-Place Concrete, to ensure that concrete curing compounds used do not interfere with adhesion of resilient flooring. The Resilient Flooring Subcontractor shall pay for all testing, by an independent agency, of substrates designated to receive resilient flooring, as necessary and required to comply with the approved manufacturer’s minimum relative humidity level requirements.

1.10 EXTRA MATERIAL

A. Provide factory packaged, wrapped, and labeled, maintenance stock equal to 2 percent of the actual quantity of each type and color of flooring and stair tread/riser installed, and 2 percent of the actual quantity of each type and color of trim and base installed.

1.11 CUTTING AND CORING

A. The installation of new Work that requires cutting and coring of floors, walls, and roofs with dimensions 5-1/2 in. or less shall be performed by the Subcontractor of this Section. The General Contractor shall cut and core floors, walls, and roofs with dimensions not indicated by the Subcontractor of this Section.

1.12 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner's Project Manager, Architect, and related subcontractors.

PART 2 - PRODUCTS

2.01 RESILIENT BASE AND ACCESSORIES

A. Resilient base shall be solid color rubber, cove base, as manufactured by Armstrong, or equal by Johnsonite, BurkeMercer, or Flexco, complying with the following material and performance characteristics:
   1. Type TP rubber Group 1, in accordance with requirements of ASTM F 1861
   2. Dimensions shall be 4 in. high x .125 in. thick x 100 ft. rolls. Provide a 6 in. high base in the corridors.
   3. Corners shall be factory formed interior and exterior.
   4. Finish shall be matte.

B. Provide CRS Series by Johnsonite, or equal, standard rubber, tapered profile, edge reducer strips or transitions strips necessary to provide smooth, uninterrupted transition from resilient flooring to adjacent dissimilar flooring materials.

C. Provide leveling compound, concrete primers, and waterproof adhesives necessary to comply with the approved manufacturer's written instructions for installation of resilient flooring and base, trim, and accessories.

D. Provide a minimum of 48 colors, as selected by the Architect from the approved manufacturer's complete selection of standard and premium colors for all base, reducers, and transitions.

PART 3 - EXECUTION

3.01 INSPECTION

A. The Resilient Flooring Subcontractor shall examine substrates and conditions under which this Work is to be performed and notify General Contractor, in writing, of conditions detrimental to the proper completion of the Work. Beginning Work means Installer accepts substrates and conditions.

3.02 PREPARATION

A. Strictly comply with the approved manufacturer's written installation instructions, except where more restrictive requirements are specified in this Section.

B. Vacuum clean subfloors immediately before installation.

C. Check substrate tolerances and fill holes, depressions, and cracks with leveling compound. Correct deficiencies in accordance with requirements of the Contract Documents to create a level substrate in true plane.

D. Perform moisture, alkalinity, and bond tests on concrete substrates to determine surfaces to receive resilient flooring are cured and dry in accordance with moisture and alkalinity limits established by the approved resilient flooring manufacturer.

1. Repair substrate cracks in accordance with the approved water vapor reduction and alkalinity control system and resilient flooring manufacturers' written requirements.

E. Apply the approved manufacturer's required primer prior to application of adhesive, to comply with the approved manufacturer's requirements for porous or powdery subfloors.

3.03 APPLICATION OF ADHESIVES

A. Mix and apply adhesive in accordance with the approved manufacturer's most stringent written instructions. Provide safety precautions during mixing and application as recommended by adhesive manufacturer.

B. Apply adhesives with notched trowel or other suitable tool uniformly over surfaces in accordance with the following minimum criteria.

1. Cover only that amount of area which can be covered by flooring material within the recommended Working time of the adhesive.
2. Remove any adhesive which dries or films over
3. Do not soil walls, bases, or adjacent areas with adhesives
4. Promptly remove any spillage
5. Clean trowel and rework notches to insure proper application of adhesive.

3.04 INSTALLATION OF RESILIENT BASE AND ACCESSORIES

A. Fit material neatly and tightly into breaks and recesses, including at toe kick of all wood casework, around pipes and penetrations, under saddles or thresholds, and around permanent cabinets and equipment.

B. The installation of resilient base and accessories shall be in accordance with the approved manufacturer's written requirements.

C. Base Components: Adhere base to walls, columns, casework, including toe kicks, and all other permanent surfaces and fixtures. Tightly bond all components to substrates encountered. Base shall be installed from rolls to minimize seams. Apply base with 100 percent coverage of adhesive and hand roll to ensure full contact and adhesion to eliminate any gaps between wall and base. Form internal and external corners using pre-molded corners for cove base, and back scoring and bending sufficient length around corner for straight base. Scribe base accurately to abutting materials.

1. The top edge of base adhered to irregular wall surfaces, including but not limited to CMU, shall be filled with sealant to eliminate visible gaps. Sealant color shall be selected by the Architect to match base color.

3.05 CLEANING AND PROTECTION

A. Repair minor damage to eliminate all evidence of repair. Clean exposed surfaces using materials and methods recommended by manufacturer of material or product being cleaned. Remove excess adhesives immediately. Remove and replace Work that cannot be successfully repaired or cleaned.

B. Prohibit traffic over newly installed flooring for at least 48 hours. Provide temporary protection to ensure Work being without damage or deterioration at time of final acceptance. Remove protection and clean immediately before final acceptance.

3.06 RUBBISH REMOVAL

A. The Subcontractor of this Section shall stockpile and drop daily of all wastes and debris at areas designated by the General Contractor.

B. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION

SECTION 09 65 16

RESILIENT FLOORING
(Filed Sub-Bid Required)

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 FILED SUB-BID REQUIREMENTS

A. Sub-bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the Enter Name and Address for Place of Bid Openging at time and place stipulated in the "Invitation to Bid/Notice to Contractors".

Name of Sub-Bidder:

Project:	Worcester Public Schools ADA Upgrades for Challenge & Reach, Gerald Creamer, Lincoln, and Thorndyke Schools.
Sub-Bid for Section:	09 65 16 – Resilient Flooring

B. Each sub-bid submitted for work under this Section shall be on forms furnished by the City of Worcester as required by Section 44F of Chapter 149 of the General Laws, as amended. Sub-Bid forms may be obtained at the Enter Name and Address of location where forms may be obtained in person, or by written request.

C. Sub-bids filed with the City of Worcester shall be accompanied by a BID BOND or CASH or CERTIFIED CHECK or a TREASURER'S or CASHIER"S CHECK issued by a responsible bank or trust company payable to the City of Worcester in the amount of five (5) percent of the bid. A sub-bid accompanied by any other form of bid deposit than those specified will be rejected.

D. The Sub-Bidder of this Section shall include Work of the following Sections:

1. 09 65 13 - Resilient Base and Accessories

E. The Sub-Bidder of this Section shall examine all drawings and specification sections for requirements affecting the Work of this Section as shown primarily in the following drawings:

1. Lincoln Elementary School: A1.01 through A12.01.
2. Thorndyke Road Elementary School: A1.01 and A9.01.

F. The Sub-Bidder of this Section shall examine other drawings and specification sections that could affect the Work of this Section as it relates to coordination. The other drawings are the following:

1. Lincoln Elementary School: D1.01 through D7.01; S0.01 through S1.02; FP1.01 through FP1.03; DP1.01 and P1.01; ED.1 through FA.2; DH1.01 and H1.01; VT.01.
2. Thorndyke Road Elementary School: D1.01 through D7.01; S0.01 through S2.01; FP1.01 through FP1.03; DP1.01 through P1.02; ED.0 through FA.3; H1.01 and H1.03; VT.02.

1.03 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:

1. Subfloor preparation, including in-situ moisture and Ph level testing of substrate.
2. Vinyl Composition Tile (VCT) with moisture mitigation.
3. Linoleum sheet flooring with moisture mitigation
4. Rubber stair landings, one-piece stair tread, nosing, risers, and moisture mitigation.
5. Adhesives
6. Cutting and coring
7. Initial cleaning, sealing, and polishing of all flooring installed under the Work of this Section.

1.04 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following Divisions:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
2. Section 02 41 13 - Selective Demolition
3. Section 03 54 13 - Cementitious Underlayment
4. Section 04 20 00 – Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.05 QUALITY ASSURANCE

A. Provide each type of resilient flooring and accessories as produced by a single manufacturer, including recommended primers, adhesives, sealants, and leveling compounds. Manufacturers of resilient flooring materials shall have a minimum of 10 years in the production and sale of types of flooring materials required for this project and be able to reference successful projects of similar magnitude and scope.

B. The installer shall employ personnel certified and trained by the approved manufacturer, with technical qualifications and facilities required to complete the Work of this Section in accordance with the Contract Documents.

C. Before beginning primary Work of this Section, provide minimum 100 square foot mock-ups of each resilient flooring system specified at locations acceptable to Architect and obtain Architect's acceptance of visual qualities. Protect and maintain acceptable mock-ups throughout the Work of this Section to serve as criteria for acceptance of this Work. Acceptable mock-ups may be incorporated into the finished Work.

D. The Resilient Flooring Subcontractor shall provide the required testing by an independent agency and a minimum of ten in-situ Hygrometer Probe Tests in accordance with requirements of ASTM F 2170. Results of tests shall demonstrate a Relative Humidity of less than 75 percent within concrete slabs-on-grade and above grade. Results of tests shall be provided to the Owner prior to commencing the Work of this Section. Failure by the Resilient Flooring Subcontractor to provide the required testing, maintain specified level of relative humidity, and subsequent failure of areas of resilient flooring shall not be cause for additional cost to Owner for repair or replacement of areas of failed flooring.

1.06 TEST

A. The Resilient Flooring Subcontractor shall pay for all testing of substrates to receive resilient floor tile as necessary and required to comply with the approved manufacturer’s minimum moisture and Ph level requirements. Testing should be conducted in accordance with requirements of ASTM F 2170 for determining relative humidity in concrete slabs using in situ probes.

1.07 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures, and in accordance with requirements of the Contract Documents.

B. Submit a complete line of manufacturer's standard and premium samples showing the complete range of colors, textures, and finishes available for each material used.

C. Submit three full-size samples of each material that is to be used in the finished Work having a minimum area of 144 square inches. Provide 6 in. lengths of base and trim pieces.

1.08 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products to project site in the approved manufacturer's original, unopened containers with labels indicating brand names, colors, patterns, and quality designations, legible and intact. Store and handle in strict compliance with the approved manufacturer's written instructions. Protect from damage.

B. Store flooring, adhesives, and accessories in original containers at not less than 70 deg. F for not less than 48 hours immediately prior to installation.

1.09 PROJECT CONDITIONS, SEQUENCING AND SCHEDULING

A. Maintain a minimum temperature of 60 deg. F and a maximum temperature of 75 deg. F in the spaces to receive flooring and accessories for a minimum of 48 hours before, during, and after

installation. Thereafter, maintain a minimum temperature of 55 deg. F (13 deg. C) in areas where Work has been completed. Protect all materials from the direct flow of heat from hot-air registers, radiators, or other heating fixtures and appliances.

B. Proceed with Work only when substrate construction and penetrating Work is complete. Perform the Work of this Section after other finishing operations, including painting, have been completed.

C. Comply with the approved manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting installation of the Work of this Section. Evaluate slab condition, including slab moisture and pH content and extent of repairs required, if any. Concrete to receive resilient flooring shall have cured for at least 28 days and be free of all curing compounds. Test concrete substrate to determine acceptable moisture levels prior to installation. Testing should be conducted in accordance with requirements of ASTM F 2170 for determining relative humidity in concrete slabs using in situ probes. Coordinate Work of this Section with Work of Section 03 30 00 – Cast-in-Place Concrete, to ensure that concrete curing compounds used do not interfere with adhesion of resilient flooring. The Resilient Flooring Subcontractor shall pay for all testing, by an independent agency, of substrates designated to receive resilient flooring, as necessary and required to comply with the approved manufacturer’s minimum relative humidity level requirements.

1.10 EXTRA MATERIAL

A. Provide factory packaged, wrapped, and labeled, maintenance stock equal to 2 percent of the actual quantity of each type and color of flooring and stair tread/riser installed, and 2 percent of the actual quantity of each type and color of trim and base installed.

1.11 CUTTING AND CORING

A. The installation of new Work that requires cutting and coring of floors, walls, and roofs with dimensions 5-1/2 in. or less shall be performed by the Subcontractor of this Section. The General Contractor shall cut and core floors, walls, and roofs with dimensions not indicated by the Subcontractor of this Section.

1.12 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner’s Project Manager, Architect, and related subcontractors.

PART 2 - PRODUCTS

2.01 RUBBER STAIR TREADS, RISERS AND LANDINGS

A. Rubber treads and risers shall be Nora Grano 926 as manufactured by Freudenburg, or equal by Fiesta by Roppe or Speckled by Johnsonite.

B. Rubber treads and risers shall be asbestos free, with a minimum rubber content of 46 percent and complying with the following requirements:

1. Treads and risers shall comply with requirements of ASTM F 2169
2. Treads and risers shall be one-piece, full width and shall not require nose caulking.
3. The thickness shall be .20 in. overall.
4. Surface finish shall be Hammered and pre-sanded back.
5. Taber-Abrasion with an H-18-wheel, 500-gram load, 1000 cycles, resulting in weight loss not greater than .60, in accordance with requirements of ASTM D 3389
6. Slip Resistance shall be equal to or greater than 0.6, ADA compliant, in accordance with requirements of ASTM D 2047
7. The flammability rating shall be Class 1, in accordance with requirements of ASTM E 648 and NFPA 253, NSBIR 75 950 not less than 0.45 watts per square centimeter.
8. Smoke Density shall be less than 450, per NFPA 258 and ASTM E 662
9. Hardness according to ASTM D 2240, Shore A, not less than 85.
10. The product shall contain no polyvinyl chloride.
11. The product shall have a 10-year wear warranty.
12. Environmental Product Declaration No.: 4787273649.101.1
13. Product shall be installed with nora Stepfix, an odorless and solvent-free adhesive system that meets SCAQMD Rule 1168
14. The product shall meet CA 01350 specification requirements.
15. Manufacturer shall be ISO 14001 Environmental Management Systems Certified
16. Provide a minimum of 36 colors, as selected by the Architect from the approved manufacturer's complete selection of standard colors.

C. Tiles for landings and elevator cab shall be Nora Grano 926 as manufactured by Freudenburg, or equal by Fiesta by Roppe or Speckled by Johnsonite, complying with the following requirements:

1. Tiles shall be asbestos free, with a minimum rubber content of 37 percent.
2. Size shall be 24 in x 24 in., or 40 in. x 40 in., with smooth, double sanded back.
3. The thickness shall be 3.2 to 3.5 mm.
4. Surface finish shall be Hammered.
5. Taber-Abrasion with an H-18-wheel, 500-gram load, 1000 cycles, resulting in weight loss not greater than one gram, per ASTM D 3389
6. Slip Resistance shall be equal to or greater than 0.6, ADA compliant, per ASTM D 2047
7. Hardness according to ASTM D 2240, Shore A, not less than 85.
8. The product shall contain no polyvinyl chloride.
9. The product shall have a 10-year wear warranty.
10. Environmental Product Declaration No.: 4787273649.101.1
11. The product shall meet CA 01350 specification requirements.
12. The product adhesive shall meet GreenGuard Children & Schools requirements.
13. Manufacturer shall be ISO 14001 Environmental Management Systems Certified
14. Provide a minimum of twelve colors, as selected by the Architect from the approved manufacturer's complete selection of standard colors.

2.02 RUBBER TREAD AND RISER ADHESIVES

A. Provide written confirmation from an approved rubber flooring manufacturer that specified adhesives are compatible with rubber flooring and approved by the flooring manufacturer to indicate specified adhesives comply with the requirements of this Section.

B. The adhesives shall be Ultrabond ECO 300 manufactured by MAPEI or equal. Adhesives shall comply with the following performance characteristics:

1. Polymer Type: Vinyl arcylic
2. Percent Solids: 60 percent to 65 percent
3. VOC: 29 g/L (Rule # 1168 of California's SCAQMD)
4. pH: 7 to 10
5. Density: 10.8 lbs. per U.S. gal.
6. Flash Point (ASTM D56): greater than 212°F

2.03 VINYL COMPOSITION TILE (VCT)

A. Vinyl composition tile (VCT) shall be Standard Excelon Imperial Texture and Multi-colors, as manufactured by Armstrong, or Architect approved equal by Tarkett or Mannington.

B. VCT shall be composed of polyvinyl chloride resin binder, plasticizers, fillers, and pigments, with colors and texture dispersed uniformly throughout its thickness, and complying with the following minimum requirements:

1. Type 2, through pattern and color, in accordance with requirements of ASTM F 1066
2. Dimensions shall be 12 in. x 12 in. x .125 in.
3. Minimum density shall be 75 PSI in accordance with requirements of ASTM F 970
4. Slip resistance shall be equal to or greater than 0.6, ADA compliant, per ASTM D 2047
5. Environmental Product Declaration No. EPD-0001
6. Recycled Content: 1 percent Pre-Consumer

C. Provide resilient flooring and base materials that are "through pattern" and uniform in thickness and size. Color variations in tile with variegated patterns shall be kept to a minimum. Edges shall be cut accurately and square. Colors shall be as selected by the Architect from the approved manufacturer's complete selection of standard and premium colors. The manufacturer's standard product line shall provide a minimum of sixty different colors for selection by the Architect. Resilient flooring patterns shall be comprised of a minimum of 30 percent field tile and 70 percent accent tile. A minimum of twelve colors, two field colors and a maximum of 10 accent colors, shall be selected.

2.04 VCT ADHESIVE

A. VCT flooring adhesive shall be premium clear, thin-spread, Ultrabond ECO 711 as manufactured by MAPEI or Architect approved equal. Adhesive shall have high moisture resistance up to 8 lbs. in MVER, and to comply with the following performance characteristics:

1. Polymer Type: SBR emulsion solution
2. Percent Solids: 60% to 65%
3. VOC: 11 g/L (Rule # 1168 of California's SCAQMD)
4. pH: 9 to 10
5. Trowelability: Light, easy
6. Density: 8.9 lbs. per U.S. gal.

7. Consistency: Creamy
8. Color: Off-white
9. Shelf Life: 2 years when stored in original packaging at 73°F
10. Storage Conditions: 40°F to 100°F
11. Flash Point (Tag): >212°F
12. Protect from traffic: 24 hours for light traffic; 48 hours for heavy traffic.

2.05 LINOLEUM SHEET FLOORING

A. Provide 2 meters wide calendered linoleum compact floor covering in sheet with excellent resistance to everyday wear and tear in high traffic areas, Marmorette as manufactured by Gerflor or equal by Tarkett. The linoleum shall comply with the following properties:

1. Its weight is 2400gr/sqm in. in 2.5mm.
2. It features a marbled design and presents a matt finish, is composed of 98% natural materials (bio-based and mineral): linseed oil, wood flour, resins, cork, minerals, and jute fabric, among which 76% are rapidly renewable.
3. The flooring is produced with Neocare™ solvent-free surface treatment, an exclusive photo-cured acrylate-based lacquer surface treatment obtained by triple laser UV cross linking. Neocare™ offers excellent scratch resistance as well as resistance to chemicals found in aggressive environments such as bleach, hydro alcoholic solutions, Betadine and Eosin as well as markers making maintenance easier and increasing the life of the flooring.
4. This treatment avoids performing any polishing throughout the lifetime of the product. It can however be polished following usual recommendations and according to the customer's wishes.
5. The products ensure perfect indoor air quality (TVOC at 28 days (EN 16516) < 10 microgram/m3) and are classified A + (the best class) in the context of health labeling. It is Floorscore®, M1 and Blue Angel certified.
6. The floorings are 100% recyclable, are composed of minimum 25% recycled content and up to 40% recycled content, 100% controlled, are REACH compliant and rated Cfl-s1 for fire resistance.
7. Designed and manufactured in a sustainable way in a plant awarded with ISO 9001 (quality), ISO 14001 (environment) and ISO 50001 (energy) certifications, the floorings are Cradle to Cradle certified™ Silver. They are Environmental Performance Declaration (EPD) certified by an external laboratory indicating carbon neutrality during the first stages of its life cycle ("from cradle to gate ").
8. The Camouflage welding rod makes the connections between the strips invisible.
9. It is antistatic, antibacterial according to ISO 22196 / JIS Z 2801 and antiviral according to ISO 21702

B. Provide a minimum of 60 colors to create patterns, as selected by the Architect from the approved manufacturer's complete selection of standard colors.

2.06 LINOLEUM FLOOR ADHESIVES

A. Provide written confirmation from approved linoleum flooring manufacturer that specified adhesives are compatible with linoleum flooring and approved by the flooring manufacturer to indicate specified adhesives complies with the requirements of this Section.

B. Adhesives shall be Forbo Sustain 1195 as manufactured by Forbo or equal. Adhesives shall comply with the following performance characteristics:

1. SCS-Certified: 25 percent Post-Consumer Recycled Content (PCC)
2. Cradle to Cradle Certified™ at the Gold level.
3. Cradle to Cradle Certified™ products are evaluated for material health, material reutilization, renewable energy se and carbon management, water stewardship, and social fairness. For more information visit www.c2ccertified.org.
4. Packaged in biodegradable plastic pails.
5. FloorScore Certified by SCS Global Services
6. Dual Acrylic Polymer
7. Non-flammable; 100 percent Solvent free
8. Storage: Freeze-thaw stable: 1 cycle at 20 deg. F. If the pail is opened and found to be frozen, let it set closed and undisturbed at room temperature until thawed. DO NOT try to mix frozen adhesive.
9. Shelf life: 2 years in unopened container
10. Appearance and Odor: Yellow paste with little or no odor
11. VOC Emissions: 0 grams per liter (calculated per CA South Coast Rule 1168)
12. Spread Rate: Approximately 125 square feet per gallon.
13. Available in four gallons units

2.07 MOISTURE MITIGATION

A. Provide written confirmation from approved resilient flooring manufacturer that specified moisture mitigation systems are compatible with flooring adhesives and approved by the flooring manufacturers to indicate specified moisture mitigation system complies with the requirements of this Section.

B. The moisture vapor control system shall be alkali-resistant, two-component, 100 percent solids epoxy resin, ASTM F3010-13, Mapei Planiseal PMB as manufactured by MAPEI or equal by Koster or Vexcon. The moisture vapor control system shall comply with the following characteristics:

1. VOC:	3 g per L (Rule 1168 of California's SCAQMD)
2. Permeability:	less than 0.1 perm at greater than 10 mils DFT per ASTM E96-05
3. Reduction of Moisture Vapor:	greater than 96 percent per ASTM E96-05
4. Pull-of Adhesion/Bond Strength:	greater than 1,000 psi with failure in concrete substrate (at 28 days per ASTM D7234)
5. Resistance to high alkalinity (ph14):	14-day spot test, covered – no effect.

14-day spot test, uncovered – no effect
14-day immersion – no effect

PART 3 - EXECUTION

3.01 INSPECTION

A. The Resilient Flooring Subcontractor shall examine substrates and conditions under which this Work is to be performed and notify General Contractor, in writing, of conditions detrimental to the proper completion of the Work. Beginning Work means Installer accepts substrates and conditions.

B. The Resilient Flooring Subcontractor shall pay for in-situ moisture and Ph level testing of the substrate. The testing shall be performed by an independent agency with an adequate number, ten minimum of in-place Hygrometer Probe Tests in accordance with the requirements of ASTM F 2170. Results of tests shall demonstrate a Relative Humidity of less than 75 percent within concrete slabs-on-grade and above grade. Results of tests shall be provided to the Owner prior to commencing the Work of this Section. Failure by the Resilient Flooring Subcontractor to provide the required testing and subsequent failure of areas of resilient flooring shall not be cause for additional cost to Owner for repair or replacement of areas of failed flooring.

3.02 PREPARATION

A. Strictly comply with the approved manufacturer's written instructions, except where more restrictive requirements are specified in this Section, including application of water vapor reduction and alkalinity control system, to comply with the approved manufacturer’s written requirements for maximum water vapor and alkalinity content of concrete substrates.

B. Vacuum clean subfloors immediately before installation.

C. Check subfloor tolerances and fill holes, depressions, and cracks with leveling compound. Scrape, grind, or sand down ridges and irregularities to create a level substrate in true plane.

D. Perform moisture, alkalinity, and bond tests on concrete substrates to determine surfaces to receive resilient flooring are cured and dry in accordance with moisture and alkalinity limits established by the approved resilient flooring manufacturer. Provide water vapor reduction and alkalinity control system at all new concrete slabs called for to receive resilient flooring in accordance with requirements of this Section. Resilient flooring shall include, but not be limited to, adhered rubber sports flooring in corridors and locker rooms, and linoleum.

1. Repair substrate cracks in accordance with the approved water vapor reduction and alkalinity control system and resilient flooring manufacturers’ written requirements.
2. Randomly adhere 3 ft. x 3 ft. panels of the approved flooring materials 50 ft. apart throughout areas to receive resilient flooring. Install test panels with the approved manufacturer’s required adhesive. If panels are not securely bonded after 72 hours, reclean substrates and repeat test until adequate bond is achieved.

E. Apply the approved manufacturer’s required primer prior to application of adhesive to comply with the approved manufacturer’s requirements for porous or powdery subfloors.

3.03 APPLICATION OF ADHESIVES

A. Mix and apply adhesive in accordance with the approved manufacturer's most stringent written instructions. Provide safety precautions during mixing and application as recommended by adhesive manufacturer.

B. Apply adhesives with notched trowel or other suitable tool uniformly over surfaces in accordance with the following minimum criteria.
   1. Cover only that amount of area which can be covered by flooring material within the recommended Working time of the adhesive.
   2. Remove any adhesive which dries or films over
   3. Do not soil walls, bases, or adjacent areas with adhesives
   4. Promptly remove any spillage
   5. Clean trowel and rework notches to insure proper application of adhesive.

3.04 INSTALLATION OF FLOORING AND STAIR NOSING-TREAD-RISER

A. Fit flooring material neatly and tightly into breaks and recesses, including at toe kick of all wood casework, around pipes and penetrations, under saddles or thresholds, and around permanent cabinets and equipment.

B. Installation of resilient floor tile materials shall be in accordance with the following procedures:
   1. Layout tile from center of room or space and install tile from the center, working toward the outside room perimeter. Lay tile parallel to room axis in straight courses with cross-joints straight; lay tile with grain or pattern running in the perpendicular direction as adjacent tile.
   2. Do not install floor tile equal to or less than one half the width of a field tile, except were approved by the Architect for irregularly shaped rooms or spaces. Cut border tile neatly and accurately to fit within 1/64 in. of abutting surfaces.
   3. All areas to receive resilient floor tile shall be rolled with a 150 pounds roller in accordance with the approved manufacturer’s written instructions, to ensure good contact and bond.

C. Stair Tread-Riser Components: Adhere one piece tread-riser to concrete and steel stairs with the approved manufacturer's recommended adhesives. Tightly bond all components to substrates encountered.

3.05 CLEANING AND PROTECTION

A. Repair minor damage to eliminate all evidence of repair. Clean exposed surfaces using materials and methods recommended by manufacturer of material or product being cleaned. Remove excess adhesives immediately. Remove and replace Work that cannot be successfully repaired or cleaned.

B. Prohibit traffic over newly installed flooring for at least 48 hours. Provide temporary protection to ensure Work being without damage or deterioration at time of final acceptance. Remove protection and clean immediately before final acceptance.

C. Provide initial maintenance of rubber sports flooring in accordance with the approved manufacturer's most stringent written instructions, and as follows:
   1. Do not wet wash, scrub, or strip flooring for a minimum of seven days following installation.
   2. Vacuum thoroughly prior to commencing initial maintenance procedures.
   3. Rinse thoroughly and allow it to dry completely.
   4. Apply high quality, stain resistant sealer, Armstrong S-495 Floor Sealer, or equal, in accordance with manufacturer’s written requirements.

5. Apply a minimum of seven coats of high quality, commercial floor polish, Armstrong S-480 Floor Polish, or equal, in accordance with manufacturer's written requirements. Polish shall contain a minimum of 30 percent solids. Each coat of polish shall be burnished prior to application of each succeeding coat.

3.06 RUBBISH REMOVAL

A. The Subcontractor of this Section shall stockpile and drop daily all wastes and debris at areas designated by the General Contractor.

B. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION

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SECTION 09 91 13

PAINTING
(Filed Sub-Bid Required)

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 FILED SUB-BID REQUIREMENTS

A. Sub-bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the Enter Name and Address for Place of Bid Openging at time and place stipulated in the "Invitation to Bid/Notice to Contractors".

Name of Sub-Bidder:

Project: Worcester Public Schools ADA Upgrades for Challenge & Reach, Gerald Creamer, Lincoln, and Thorndyke Schools.

Sub-Bid for Section: 09 91 13 - Painting

B. Each sub-bid submitted for work under this Section shall be on forms furnished by the City of Worcester as required by Section 44F of Chapter 149 of the General Laws, as amended. Sub-Bid forms may be obtained at the Enter Name and Address of location where forms may be obtained in person, or by written request.

C. Sub-bids filed with the City of Worcester shall be accompanied by a BID BOND or CASH or CERTIFIED CHECK or a TREASURER'S or CASHIER"S CHECK issued by a responsible bank or trust company payable to the City of Worcester in the amount of five (5) percent of the bid. A sub-bid accompanied by any other form of bid deposit than those specified will be rejected.

D. The Sub-Bidder of this Section shall examine all drawings and specification sections for requirements affecting the Work of this Section as shown primarily in the following drawings:

1. Challenge and Reach Academy: A1.01 through A10.01
2. Gerard Creamer School: A1.01 through A10.01
3. Lincoln Elementary School: A1.01 through A12.01.
4. Thorndyke Road Elementary School: A1.01 and A9.01.

E. The Sub-Bidder of this Section shall examine other drawings and specification sections that could affect the Work of this Section as it relates to coordination. The other drawings are the following:

1. Challenge and Reach Academy: D1.01 and D7.01; DP1.01 and P1.01
2. Gerard Creamer School: D1.01 through D7.01; DP1.01 and P1.01; ED.1 through FA1.1
3. Lincoln Elementary School: D1.01 through D7.01; S0.01 through S1.02; FP1.01 through FP1.03; DP1.01 and P1.01; ED.1 through FA.2; DH1.01 and H1.01; VT.01.

4. Thorndyke Road Elementary School: D1.01 through D7.01; S0.01 through S2.01; FP1.01 through FP1.03; DP1.01 through P1.02; ED.0 through FA.3; H1.01 and H1.03; VT.02.

1.03 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, preparation, painting and finishing of all exposed interior surfaces except the following:
   1. Factory finished items.
   2. Finished metal surfaces of stainless steel, copper, brass, bronze, and aluminum.
   3. Finished metal surfaces that are plated such as finished hardware.
   4. Surfaces in concealed areas such as crawl spaces, above ceilings, and the like
   5. Moving parts, code required labels, and equipment data plates.
   6. Mechanical and electrical items not in public spaces
   7. Acoustical ceiling systems
   8. Seal or coat all exposed concrete surfaces.
   9. Finished masonry surfaces such as face brick, glazed block, ceramic tile, and the like.
   10. Testing for VOC compliance

B. Carefully examine all the Contract Documents for requirements which affect the Work of this Section. The exact scope of Work of this Section cannot be determined without a thorough review of all specification Sections and other Contract Documents.

1.04 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
   2. Section 02 41 13 - Selective Demolition
   3. Section 03 54 13 - Cementitious Underlayment
   4. Section 04 20 00 – Unit Masonry
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
   7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
   8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
   9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
   10. DIVISION 09 – FINISHES; including all Sections contained therein.
   11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
   12. Section 14 24 00 – Hydraulic Elevator
   13. Section 21 00 00 – Fire Suppression
   14. Section 22 00 00 – Plumbing
   15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
   16. Section 26 00 00 – Electrical
   17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
   18. Section 28 10 00 – Fire Alarm
   19. Section 31 20 00 – Earth Moving

1.05 QUALITY ASSURANCE

A. All materials, including primers, other undercoat paint, and finish paint shall be produced by a single manufacturer. Use thinners and other accessory materials acceptable to the approved paint manufacturer and use only within the approved manufacturer's recommended limits.

B. Review other Sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnishing information or characteristics of finish materials are provided for use, to ensure that compatible coats are used.

C. Before beginning primary Work of this Section, provide 100 square foot mock-ups of each color and paint system at locations acceptable to Architect and obtain Architect's acceptance of visual qualities. Protect and maintain acceptable mock-ups throughout the Work of this Section to serve as criteria for acceptance of this Work. Acceptable mock-ups may be incorporated into the finished Work.

1.06 TESTS

A. The General Contractor shall employ an independent testing agency to perform tests, evaluations, and certifications. Cooperate and permit samples of materials to be taken as they are used. The Painting Subcontractor shall pay all costs associated with tests demonstrating failure of the tested material to comply with the requirements of the Contract Documents.

1.07 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures and in accordance with requirements of the Contract Documents.

B. Submit list of all materials proposed for use, indicating:

1. Manufacturer
2. Product name
3. Surface for which proposed.

C. Submit color swatches showing the complete range of colors and finishes available for each paint and finish system.

D. Before painting mock-ups, submit representative samples of each material that is to be exposed in the finished Work, showing the full range of color and finish variations expected. Prepare paint samples on gypsum drywall or poster board and make samples not less than 12 inches square. On actual wood surfaces provide 4 in. x 8 in. samples of each natural and stained wood finish

1.08 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products in unopened, factory labeled packages. Store and handle in strict compliance with the approved manufacturers' written instructions and protect from freezing and damage.

B. Avoid the possibility of fire by removing flammable materials, solvents, and spirits from the project site or by storing materials in UL approved fire-resistive cabinets. Keep Work area free from flammable waste and soiled rags.

1.09 PROJECT CONDITIONS

A. Perform Work only when existing and forecasted conditions are within the limits established by the approved manufacturer of the materials and products used.

1. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50°F and 90°F, unless otherwise permitted by manufacturer's printed instructions.
2. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air temperatures are between 45°F and 95°F, unless otherwise permitted by paint manufacturer's printed instructions.
3. Do not apply paint in snow, rain, fog, or mist, or when relative humidity exceeds 85 percent, or to damp or wet surfaces, unless otherwise permitted by paint manufacturer's printed instructions. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer during application and drying periods.

B. The Painting Subcontractor shall examine substrates, supports, and conditions under which this Work is to be performed and notify General Contractor, in writing, of conditions detrimental to the proper completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected. Beginning Work means Installer accepts substrates and conditions.

C. Comply with the approved manufacturer's requirements and recommendations for area ventilation.

D. Perform Work only when permanent lighting system is operational and in use. If not in use provide temporary lighting that simulates as closely as possible a permanent lighting system.

E. Cover or otherwise protect finished Work of other trades.

1.10 EXTRA MATERIAL

A. Provide maintenance stock in the approved manufacturer’s new, unopened containers equal to 5 percent of the actual quantity installed. Provide a minimum of two, five-gallon containers of each wall color and two, one-gallon containers of each trim color.

1.11 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner’s Project Manager, Architect, and related subcontractors.

B. Coordinate the Work of this Section with Work specified in other Sections. Furnish information on finish materials to be used in the field to ensure that correct prime coats are used in the shop.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Materials shall be first line products of one of the following manufacturers, or equal:
   1. Conventional Paint Finishes:
      a. Sherwin-Williams
      b. Benjamin Moore
      c. California Paints
   2. Specialty Paint Finishes
      a. Sherwin Williams
      b. DuPont
      c. Albi Manufacturing
   3. Colored Concrete Sealer
      a. Scofield
      b. Benjamin Moore
      c. Sherwin-Williams

2.02 MATERIALS

A. Products specified are manufactured by Sherwin Williams, unless otherwise indicated. Similar products of acceptable manufacturers listed in Paragraph 2.01 may be furnished in lieu of those listed, approved by the Architect.
   1. Provide primary products of the system from the products of a single manufacturer.
   2. Products not specified by name and required for the job, such as shellac, thinners, putty, shall be "best grade" or "first Line" products of a reputable manufacturer and acceptable to the approved manufacturer of the paint coatings.
   3. Colors shall be as selected by the Architect from the approved manufacturer’s complete selection of standard and premium colors. Public areas of the building shall be considered decorative and shall require the use of several colors, including but not limited to, deeptone, bright, and accent colors. See A14 series drawings for color and paint location intent.

PART 3 - EXECUTION

3.01 INSPECTION AND PREPARATION

A. The Installer shall be solely responsible for the finishing Work and shall prepare substrates as needed to obtain the highest quality finished surfaces.

B. Strictly comply with the approved manufacturers' written instructions, except where more restrictive requirements are specified in this Section.

C. Clean surfaces in accordance with the approved manufacturer’s requirements for removal of dirt, oil, grease, mildew, asphalt, concrete splatters, and all other foreign substances. Do not finish over dirt, rust, grease, moisture, and other conditions detrimental to formation of a durable finish film.

D. Remove finished hardware, fixtures, accessories, and similar items, or tape and mask all surface not to be painted to protect these surfaces from damage or overpaint. Replace these items when finishing Work is completed.

E. Remove incompatible primers and re-prime or provide barrier coats in compliance with the approved finish paint manufacturer's written instructions.

F. Prepare masonry and concrete materials by removing laitance, efflorescence, form release agents, and surface glaze by cleaning and washing as recommended by the approved finish paint manufacturer and approved by Architect. Brush surfaces to remove loose particles. Fill cracks and irregularities with Portland cement grout to provide uniform surface texture. Allow a minimum of 60 to 90 days curing time before finishing poured and pre-cast concrete. Allow a minimum of 30 to 60 days curing time before finishing concrete masonry. Determine substrate alkalinity and moisture content and, if necessary, take appropriate remedial actions as recommended by the approved finish paint manufacturer.

G. Prepare all wood surfaces not indicated to be factory finished under the Work of Section 06 20 00 by sanding smooth, sealing knots, setting nails and fasteners, and filling holes, cracks, and imperfections with putty acceptable to the approved finish manufacturer. For transparent finished Work, use putty and filler color matched to wood to minimize its appearance. All interior and exterior woodwork shall be sealed and back primed immediately after delivery to site and before installation.

H. Prepare shop primed, ferrous metal surfaces by solvent wiping, sanding, and touching-up shop prime coats. Prepare bare metal surfaces by power tool cleaning in accordance with SSPC SP 3 requirements. Remove rust, welding flux and splatter, burrs, and all other surface defects and foreign substances. Clean surfaces by washing with water followed by phosphate rinsing. Apply prime coats immediately after completion of cleaning.

I. Aggressively clean new galvanized surfaces with grease cutting solvent, such as mineral spirits, to remove fabricating oils. After cleaning provide a SSPC SP 7 brush off blast of galvanized steel surfaces to create a 2mil profile for paint adherance. Touch-up abraded surfaces immediately with zinc-rich paint having a minimum dry film content of 95 percent by weight, Galvilite Galvanizing Repair Compound, as manufactured by ZRC, or equal.

J. Solvent clean aluminum surfaces in accordance with SSPC SP 1 requirements.

K. Finish tops, bottoms, and edges of all doors the same as door faces.

L. Clean gypsum drywall surfaces to make them free of dust and foreign substances. Joint treatment materials shall be thoroughly dry. Paint metal corner beads and trim with metal primer before application of water-based finish coatings.

M. Ducts visible through supply and return grilles shall be painted flat black.

3.02 APPLICATION

A. Strictly comply with the approved manufacturers' written instructions, except where more restrictive requirements are specified in this Section.

B. Mix and prepare materials in strict compliance with the approved manufacturers' written instructions. Do not thin materials without an Architect’s approval. Keep foreign substances out of finishing materials.

C. Provide primers as recommended by the approved finish paint manufacturer for substrates encountered. Tint all primers and undercoats to the approximate shade of the finish coat, making each coat slightly darker and closer to the finished shade. Use deep base primers for deeptone, bright, and accent colors. Prime surfaces immediately after surface preparation to prevent contamination of substrate.

D. Apply finish materials at the lowest coverage rate and the highest dry film thickness recommended by the approved manufacturer. Provide additional coats as needed to eliminate all show through and bleed through areas. Apply paint and finish systems as scheduled using brushes or rollers. Stain shall be applied with a brush and then wiped off at the proper time to produce the desired effect.

1. Spray application of paint and finish systems is acceptable for CMU, gypsum drywall, metal doors and frames, interior steel roof decks, structural steel joists, HVAC ducts, and mechanical piping, where Painting Subcontractor can demonstrate adequate control of overspray, control of coats, and has first obtained Architect's written permission. CMU and gypsum drywall shall be rolled following spray application of paint to provide a dense, uniform appearance. Provide uniform final finishes, free of runs, sags, wrinkles, streaks, shiners, brush/roller marks, color variations and other imperfections.

E. Finish interior of HVAC ductwork behind louvers and grilles, when these surfaces are visible, with flat black paint. Wall surfaces located behind wall mounted markerboards and tackboards shall be painted. Painting of surfaces located behind pre-manufactured casework is not required.

F. Fine sand all painted woodwork and painted metal between coats in accordance with the approved manufacturers' written instructions.

G. Allow the required waiting period between successive coats in accordance with the approved manufacturer's written instructions.

H. Provide final finishes which exactly match mock-ups.

I. All interior rooms shall have three accent colors, unless otherwise noted. Each accent color shall have three finish coats applied to all surfaces. All other surfaces within interior rooms will have two finish coats applied to surfaces, unless otherwise noted.

3.03 TOUCH UP, CLEANING, AND PROTECTION

A. Touch up damaged coatings and finish eliminating evidence of repair.

B. Clean finished surfaces and remove all finish splatters from adjacent Work. Remove and replace Work that cannot be successfully cleaned.

C. Provide signs and temporary protection to ensure Work being without damage or deterioration at time of final acceptance. Remove protections and re-clean as necessary immediately before final acceptance.

3.04 RUBBISH REMOVAL

A. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 50 00 – Temporary Facilities and Controls.

3.05 FINISH PAINTING SCHEDULE

A. The following finish systems refer to products of Sherwin Williams, unless indicated otherwise. Provide these systems or comparable systems from any specified manufacturer, approved by the Architect.

1. EXTERIOR FERROUS METAL
   - Primer: Sherwin Williams Pro-Cryl Primer B66 Series
   - Finish Coat 1: Sherwin Williams Pro Industrial DTM Satin B66
   - Finish Coat 2: Sherwin Williams Pro Industrial DTM Satin NB66
   - Note 1: Where rust has formed, scrape, sand and provide one coat of IMC Rust Converter M 82, prior to application of primer.
2. EXTERIOR FERROUS METAL - GALVANIZED
   - Primer: Sherwin Williams Pro-Cryl Primer, B66 Series
   - Finish Coat 1: Sherwin Williams Pro Industrial DTM Satin B66
   - Finish Coat 2: Sherwin Williams Pro Industrial DTM Satin NB66
3. INTERIOR WOOD - PAINTED
   - Primer: Sherwin Williams ProMar 200 Zero VOC Primer B28
   - Finish Coat 1: Sherwin Williams ProMar 200HP Zero VOC Interior Latex Eq-Shel B20-1900
   - Finish Coat 2: Sherwin Williams Promar 200 HP Zero VOC Interior Latex Eq-Shel B20-1900
4. INTERIOR DRYWALL
   - Primer: Sherwin Williams ProMar 200 Zero VOC Primer, B28
   - Finish Coat 1: Sherwin Williams ProMar 200 Zero VOC Interior Latex Eq-Shel B20
   - Finish Coat 2: Sherwin Williams ProMar 200 Zero VOC Interior Latex Eq-Shel B20
5. INTERIOR DRYWALL AND CEILINGS AT TOILET ROOMS - EPOXY
   - Primer: Sherwin Williams ProMar 200 Zero VOC Primer B28W02600
   - Finish Coat 1: Sherwin Williams Pro Industrial Water Based Epoxy B73
   - Finish Coat 2: Sherwin Williams Pro Industrial Water Based Epoxy B73
6. INTERIOR CONCRETE - PAINTED
   - Primer: Sherwin Williams Armorseal 8100 Spot Prime bare areas on previously painted surface.
   - Finish Coat 1: Sherwin-Williams Amorseal Water Based Epoxy Floor Coating 8100
   - Finish Coat 2: Sherwin Williams Armorseal Water Based Epoxy Floor Coating 8100
7. INTERIOR CONCRETE - SEALED
   - Primer: Sherwin Williams Amorseal Water Based Epoxy 8100 (Reduce with 1 pint of water)
   - Finish Coat 1: Sherwin Williams Armorseal Water Based Epoxy 8100
   - Finish Coat 2: Sherwin Williams Armorseal Water Based Epoxy 8100
8. INTERIOR CMU
   - Primer: Sherwin Williams Pro Industrial Heavy Duty Block Filler, B42W00150
   - Finish Coat 1: Sherwin Williams Pro Industrial Water Based Epoxy B73
   - Finish Coat 2: Sherwin Williams Pro Industrial Water Based Epoxy B73

9. INTERIOR FERROUS METAL
   - Primer: Sherwin Williams Pro-Cryl Primer, B66 Series
   - Finish Coat 1: Sherwin Williams ProMar 200 HP Zero VOC Interior Latex Semi-Gloss B31-1900 Series.
   - Finish Coat 2: Sherwin Wiliams ProMar 200 HP Zero VOC Interior Latex Semi-Gloss B31-1900 Series.

END OF SECTION

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SECTION 10 14 00

SIGNAGE AND GRAPHICS

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK

A. The Work of this Section is for Gerard Creamer, Lincoln, and Thorndyke Schools and shall include, but is not limited to furnishing and installation of the following:

1. Interior room signage with raised numbers and Braille translation
2. ADA specialty signage with raised numbers and Braille translation
3. Room signage for every room and space designated on the Contract Drawings

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contracts Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
2. Section 02 41 13 - Selective Demolition
3. Section 03 54 13 - Cementitious Underlayment
4. Section 04 20 00 – Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.04 QUALITY ASSURANCE

A. Provide primary materials which are the products of one manufacturer for each type of material required for the Work of this Section. Provide secondary materials which are acceptable to the manufacturers of the primary materials.

B. All rooms shown on the Drawings, whether specifically mentioned or not in the Signage and Graphics Schedule, shall be provided with signage required by the Architect.

C. Provide installed mock-up of each sign and graphic system specified at locations acceptable to Architect and obtain Architect's acceptance of visual qualities. Protect and maintain acceptable mock-ups throughout the Work of this Section to serve as criteria for acceptance of this Work. Acceptable mock-ups may be incorporated into the finished Work.

1.05 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures and in accordance with requirements of the Contract Documents.

B. Submit manufacturer's product data, installation instructions, use limitations and recommendations for each material used. Provide manufacturer certifications demonstrating materials comply with specified requirements.

C. Provide large scale shop drawings, including layouts of sign wording, spacing, type size, style, elevations, and details of anchorage's, connections, and accessory items, required for fabrication, installation, and erection of all parts of the Work.

D. Submit representative, full-size samples of each sign type to be installed under the Work of this Section that is to be exposed in the finished Work. Provide 3 in. x 3 in. samples showing the full range of color and finish variations expected.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle materials provided under the Work of this Section in unopened factory labeled packages, and in accordance with the approved manufacturer’s written instructions, required to protect from damage before, during, and after installation. In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the Owner.

1.07 SEQUENCING AND SCHEDULING

A. The Work of this Section shall be installed following receipt of Substantial Completion by the General Contractor, and prior to final approval by the Architect.

1.08 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner’s Project Manager, Architect, and related Subcontractors.

PART 2 - PRODUCTS

2.01 INTERIOR ROOM SIGNAGE

A. Interior room signage shall be as manufactured by Best Sign Systems, or equal by Mohawk Sign Systems or Bayuk Graphic Systems, that meet or exceed the following requirements:

1. Signs shall be .125 in. thick melamine plastic laminate with contrasting core color. Material shall be non-static, fire retardant, self-extinguishing, and impervious to most acids, alkalies, alcohol, solvents, abrasives, and boiling water, with square corners and fastened to substrate with four countersunk, tamper proof screws, or double faced, high bond, vinyl foam tape and silicone adhesive, approved by the Architect.
2. Sign characters shall be formed by blast engraving of the background following application of a graphic mask to the finish surface, resulting in raised characters and 1/32 in. high, Grade 2 Braille, integral to the sign face. Braille characters shall be located below the corresponding raised characters and symbols and separated by a 1/2 in. space.
3. Provide two 1 in. wide horizontal slots with 1/2 in. space between, with clear lexan covers.
4. Exposed background shall be finished with acrylic polyurethane paint with a non-glare finish, and a minimum 70 percent contrast ratio with the color of the finish characters, and a non-gloss finish of 11° to 19° on a 60° glossimeter. Colors of finish characters and background shall be as selected by the Architect from the approved manufacturer's complete selection of standard and premium colors.
5. Size of letters and characters shall be as follows:
   a. Numbers shall be 1 in. high.
   b. Letters shall be 5/8 in. high.
   c. Symbols shall be 4 in. high.
6. Sign size and configuration shall be as shown in the Signage and Graphics Schedule located at the end of this Section. Provide ADA signs fabricated in accordance with ADAAG 4.30.1-7.
7. Recycled Content: 22 percent Pre-Consumer

PART 3 - EXECUTION

3.01 INSPECTION

A. The Sign Installer shall examine substrates, supports, and conditions under which this Work is to be performed and notify General Contractor, in writing, of conditions detrimental to the proper completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected. Beginning Work means Installer accepts substrates and conditions.

3.02 INSTALLATION

A. Installation of the Work of this Section shall be in accordance with the approved manufacturer's written instructions, except where more restrictive requirements are specified in this Section.

B. Install Work plumb, level, in true plane and alignment. Provide signs and graphics where shown or scheduled using mechanical mounting methods for corridor, toilet room and public locations and adhesive attachment for office areas.

1. Provide blank white backers, equal in size to the sign back being covered, at all locations of room signs installed on glass. Room signs and backers mounted on glass shall be installed using clear silicone adhesive.
2. Install interior specialty signs at locations directed by the Architect.

3.03 ADJUSTING, CLEANING AND PROTECTION

A. Adjust Work to present the best possible appearance. Touch-up damaged finishes and repair damage to eliminate evidence of repair. Clean exposed surfaces using materials and methods recommended by manufacturer of material or product being cleaned. Remove and replace Work that cannot be successfully repaired or cleaned.

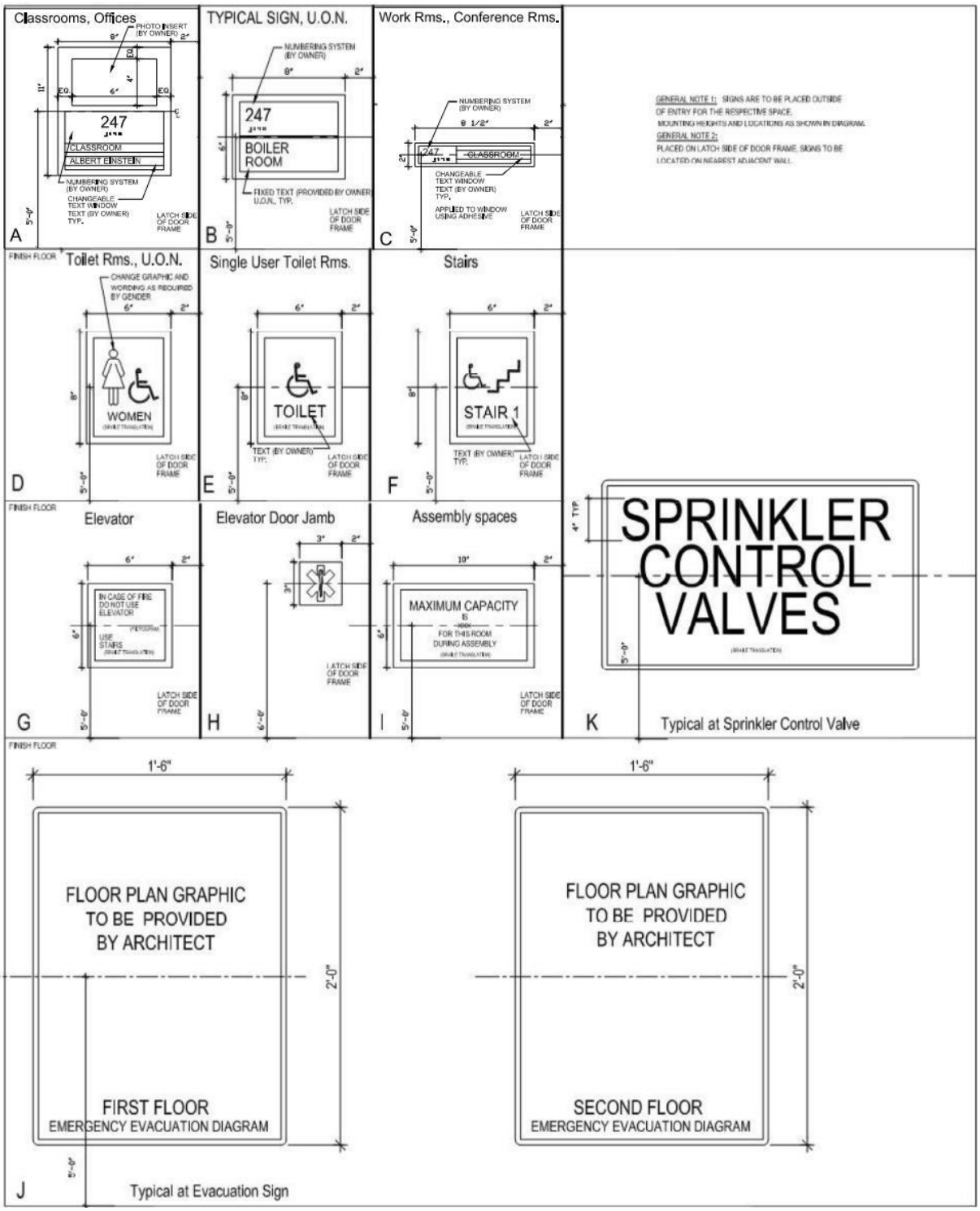
B. Provide temporary protection to ensure Work being without damage or deterioration at time of final acceptance. Remove protections and re-clean as necessary immediately before final acceptance.

3.04 RUBBISH REMOVAL

A. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION

APPENDIX G – TYPICAL INTERIOR ROOM SIGN AND GRAPHICS SCHEDULE



NOT AN EXIT
8" X 6"



L

AREA OF REFUGE
6" X 8"



M

HANDICAP ACCESS
8" X 6"



N

SECTION 10 21 13

TOILET COMPARTMENTS

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:

1. Floor mounted, overhead-braced toilet compartments.
2. Wall mounted privacy screens.
3. Support and connection hardware for all toilet partitions and vision screens installed under the Work of this Section.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
2. Section 02 41 13 - Selective Demolition
3. Section 03 54 13 - Cementitious Underlayment
4. Section 04 20 00 – Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
10. DIVISION 09 – FINISHES; including all Sections contained therein.
11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
12. Section 14 24 00 – Hydraulic Elevator
13. Section 21 00 00 – Fire Suppression
14. Section 22 00 00 – Plumbing
15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
16. Section 26 00 00 – Electrical
17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
18. Section 28 10 00 – Fire Alarm
19. Section 31 20 00 – Earth Moving

1.04 REFERENCES

A. ASTM A 666 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

B. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

C. National Fire Protection Association (NFPA) 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

D. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

E. United States EPA (Environmental Protection Agency) Registration - Bactericidal Surfaces Registered with the U.S. EPA to Legally Make Claims that these Materials Kill Infectious Bacteria.

1.05 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures and in accordance with requirements of the Contract Documents.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Shop Drawings: Provide layout drawings and installation details with location and type of hardware required.

D. Verification Samples: For each finish product specified, two samples representing actual product, color, and patterns.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: A company regularly engaged in the manufacture of products specified in this section, and whose products have been in satisfactory use under similar service conditions for not less than 5 years.

B. Installer Qualifications: A company regularly engaged in the installation of products specified in this Section, with a minimum of 5 years' experience.

C. Materials: Doors, panels, and pilasters, constructed from high density polyethylene (HDPE) resins. Partitions fabricated from polymer resins compounded under high pressure, forming a single component which is waterproof, nonabsorbent and has a self-lubricating surface that resists marks from pens, pencils, markers, and other writing instruments. Cover all plastic components with a protective plastic masking.

D. Performance Requirements:

1. Fire Resistance: Partition materials shall comply with the following requirements, when tested in accordance with ASTM E 84:
   a. Class A flame spread/smoke developed rating.
   b. Class B flame spread/smoke developed rating.

2. Material Fire Ratings:
   a. National Fire Protection Association (NFPA) 286: Pass.
   b. International Code Council (ICC): Class B.
3. Antimicrobial Touch Surfaces: Hardware touch surfaces shall be manufactured from substrates that are registered with the U.S. EPA to kill specific bacteria tested according to U.S. EPA protocols.

1.07 DELIVERY, STORAGE AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

1.08 PRODUCT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside the manufacturer’s absolute limits.

1.09 WARRANTY

A. Manufacturer guarantees its plastic against breakage, corrosion, and delamination under normal conditions for 25 years from the date of receipt by the customer. If materials are found to be defective during that period for the reasons listed above, the materials will be replaced free of charge. (Labor not included in warranty.)

1.10 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner’s Project Manager, Architect, and related subcontractors.

PART 2 - PRODUCTS

2.01 SOLID PLASTIC TOILET COMPARTMENTS

A. Provide High Density Polyethylene (HDPE), floor mounted, overhead braced toilet compartments, ‘Hiny Hiders’, as manufactured by Scranton or equal by General Partitions and Bradley. The HDPE toilet doors, panels, and pilasters shall be 1 in. thick with all edges rounded to a radius. The HDPE toilet doors, panels, and pilasters shall comply with the following properties:

1. Door & Panel Height: 55 inches
2. Pilaster: Provide floor to ceiling pilaster with stainless-steel angle. Attach angles to pilasters with 3/4 inch (19 mm) stainless steel tamper resistant Torx head screws. Pilaster sleeve height to be 4 inches (102 mm) high.

3.	Pilaster Shoes:	3 inches high one-piece molded HDPE. Secured to pilasters with a stainless-steel tamper resistant Torx head sex bolt.
4.	Headrail:	Heavy-duty extruded 6463-T5 alloy aluminum with anti-grip design. Finish to be clear anodized. Fastened to headrail brackets with stainless steel tamper resistant Torx head sex bolt and fastened at the top of the pilaster with stainless steel tamper resistant Torx head screws.
5.	Wall Brackets:	54 inches, single ear, continuous aluminum
6.	Door Hinge:	54 inches continuous stainless steel, Helix Hinge.
7.	Door Strike/Keeper:	6 inches heavy-duty extruded aluminum 6436-T5 alloy with a bright dip anodized finish. Secured to pilasters with stainless steel tamper resistant Torx head sex bolts. The bumper shall be made of extruded black vinyl.
8.	Latch Mechanism:	Stainless steel slide bolt latch and housing. Heavy-duty stainless-steel type 304. The latch and housing to have a bright finish. The slide bolt and button to have a black anodized finish.

B. The color of doors, panels, pilasters, and pilaster shoes shall be selected by the Architect from the approved manufacturer's complete selection of standard and premium colors. A minimum of four colors shall be selected.

2.02 SOLID PLASTIC PRIVACY SCREENS

A. Provide High Density Polyethylene (HDPE), wall-mounted, privacy screens at urinals, 'Hiny Hiders', as manufactured by Scranton or equal by General Partitions and Bradley. The HDPE privacy screens shall be 1 in. thick with all edges rounded to a radius. The HDPE privacy screens shall comply with the following properties.

1.	Panel:	24 in. wide x 55 in. high
2.	Pilaster:	Provide floor to ceiling pilaster with stainless-steel angle. Attach angles to pilasters with 3/4 inch (19 mm) stainless steel tamper resistant Torx head screws. Pilaster sleeve height to be 4 inches (102 mm) high.
3.	Wall Brackets:	41 inches continuous aluminum bracket. Fastened to the panel/pilaster with stainless steel tamper resistant torx head screws and fastened to wall with stainless steel tamper resistant torx head sex bolts.

B. The color of privacy screens shall be selected by the Architect from the approved manufacturer's complete selection of standard and premium colors. A minimum of four colors shall be selected.

2.03 FINISHES

A. Panels shall be water resistant, non-absorbent with a self-lubricating surface capable of resisting markings from pens, pencils, and other writing instruments.

B. The color of panels, screens, doors, and pilasters shall be homogenous throughout, and shall be as selected by the Architect from the approved manufacturer's complete selection of standard and premium colors. A minimum of six colors shall be selected. All Work in any one toilet room shall be one color.

C. All panels, doors, screens, and pilasters shall be shipped with protective masking. Masking shall be removed by the Toilet Partition Installer upon approval of the installation by the Architect.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Do not begin installation until the substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Examine areas to receive toilet partitions, screens, and shower compartments for correct height and spacing of anchorage/blocking and plumbing fixtures that affect installation of partitions. Report discrepancies to the architect.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install partitions rigid, straight, plumb, and level manor, with plastic laid out as shown on shop drawings.

C. Clearance at vertical edges of doors shall be uniform top to bottom and shall not exceed 3/8 inch (9.5 mm).

D. No evidence of cutting, drilling, and/or patching shall be visible on the finished work.

E. Finished surfaces shall be cleaned after installation and be left free of imperfections.

3.04 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

3.05 RUBBISH REMOVAL

A. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION

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SECTION 10 26 00

WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:
   1. Stainless steel corner guards and all required accessories

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
   2. Section 02 41 13 - Selective Demolition
   3. Section 03 54 13 - Cementitious Underlayment
   4. Section 04 20 00 – Unit Masonry
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
   7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
   8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
   9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
   10. DIVISION 09 – FINISHES; including all Sections contained therein.
   11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
   12. Section 14 24 00 – Hydraulic Elevator
   13. Section 21 00 00 – Fire Suppression
   14. Section 22 00 00 – Plumbing
   15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
   16. Section 26 00 00 – Electrical
   17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
   18. Section 28 10 00 – Fire Alarm
   19. Section 31 20 00 – Earth Moving

1.04 REFERENCES

A. National codes (IBC, UBC, SBCCI, BOCA and Life Safety)

B. American Society for Testing and Materials (ASTM)

1.05 QUALITY ASSURANCE

A. Installer qualifications: Engage an installer who has no less than 3 years' experience in installation of systems similar in complexity to those required for this project.

B. Manufacturer's qualifications: Not less than 5 years' experience in the production of specified products and a record of successful in-service performance.

C. Code compliance: Assemblies should conform to all applicable codes including IBC, UBC, SBCCI, BOCA and Life Safety.

D. Fire performance characteristics: Provide metal components tested in accordance with ASTM E84 for Class A/1 fire characteristics.

E. Single source responsibility: Provide all components of the wall protection system manufactured by the same company to ensure compatibility of color, texture, and physical properties.

1.06 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures and in accordance with requirements of the Contract Documents.

B. Product data and detailed specifications for each system component and installation accessory required, including installation methods for each type of substrate.

C. Shop drawings showing locations, extent, and installation details of corner guards. Show methods of attachment to adjoining construction.

D. Samples for verification purposes: Submit the following samples, as proposed for this work, for verification of guard:

1. 12 in. long sample of each model specified.

E. Product test reports from a qualified independent testing laboratory showing compliance of each component with requirements indicated.

F. Maintenance data for wall protection system components for inclusion in the operating and maintenance manuals specified in Division 1.

1.07 QUALITY ASSURANCE

A. Installer qualifications: Engage an installer who has no less than 3 years' experience in installation of systems similar in complexity to those required for this project.

B. Manufacturer's qualifications: Not less than 5 years' experience in the production of specified products and a record of successful in-service performance.

C. Code compliance: Assemblies should conform to all applicable codes including IBC, UBC, SBCCI, BOCA and Life Safety.

D. Fire performance characteristics: Provide metal components tested in accordance with ASTM E84 for Class A/1 fire characteristics.

E. Single source responsibility: Provide all components of the wall protection system manufactured by the same company to ensure compatibility of color, texture, and physical properties.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the project site in unopened original factory packaging clearly labeled to show manufacturer.

B. Material must be stored flat.

1.09 PROJECT CONDITIONS

A. Installation areas must be enclosed and weatherproofed before installation commences.

1.10 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner's Project Manager, Architect, and related Subcontractors.

PART 2 - PRODUCTS

2.01 CORNER GUARDS

A. Corner guards shall be surface mounted, stainless steel, ASTM A 276, Type 304 alloy with #4 satin finish, 16 gauge, Acrovyn CO-8 as manufactured by Construction Specialties, Inc. or equal by Grainger or Eagle Mouldings. Stainless steel corner guards shall have 90 deg. bend with 3/16 in. radius and 3-1/2 in. standard legs. Mounted with stainless steel screws.

2.02 FABRICATION

A. General: Fabricate wall protection systems to comply with requirements indicated for design, dimensions, detail, finish, and member sizes.

B. Preassemble components in shop as much as possible to minimize field assembly.

2.03 FINISHES

A. General: Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applications and designations of finishes.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

1. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Surface preparation: Prior to installation, clean substrate to remove dirt, debris, and loose particles. Perform additional preparation procedures required by manufacturer's instructions.

B. Protection: Take all necessary steps to prevent damage to material during installation required in manufacturer's installation instructions.

3.03 INSTALLATION

A. Install the work of this section in strict accordance with the manufacturer's recommendations, using only approved adhesive or mounting hardware and locating all components firmly into position, level and plumb.

3.04 CLEANING AND PROTECTION

A. General: Immediately upon completion of installation, clean material in accordance with manufacturer's recommended cleaning method.

B. Remove surplus materials, rubbish and debris resulting from installation as work progresses and upon completion of work.

C. Protect installed materials to prevent damage by other trades. Use materials that may be easily removed without leaving residue or permanent stains.

3.05 RUBBISH REMOVAL

A. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 50 00 – Temporary Facilities and Controls l.

END OF SECTION

SECTION 10 28 00

TOILET ACCESSORIES

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:
   1. Commercial quality stainless steel toilet accessories as indicated on Drawings and as scheduled herein.
   2. Mirror / Shelf

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
   2. Section 02 41 13 - Selective Demolition
   3. Section 03 54 13 - Cementitious Underlayment
   4. Section 04 20 00 – Unit Masonry
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
   7. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
   8. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
   9. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
   10. DIVISION 09 – FINISHES; including all Sections contained therein.
   11. DIVISION 10 – SPECIALTIES; including all Sections contained therein.
   12. Section 14 24 00 – Hydraulic Elevator
   13. Section 21 00 00 – Fire Suppression
   14. Section 22 00 00 – Plumbing
   15. Section 23 00 00 - Heating, Ventilating and Air Conditioning
   16. Section 26 00 00 – Electrical
   17. DIVISION 27 – COMMUNICATIONS; including all Sections contained therein.
   18. Section 28 10 00 – Fire Alarm
   19. Section 31 20 00 – Earth Moving

1.04 QUALITY ASSURANCE

A. Provide toilet accessories which are the products of one manufacturer.

1.05 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures and in accordance with requirements of the Contract Documents.

B. Provide shop drawings for installation of all accessories, including plans, elevations, and details of anchorages, connections, and installation aids.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle materials provided under the Work of this Section in unopened factory labeled packages, and in accordance with the approved manufacturer's written instructions to protect from damage before, during, and after installation. In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the Owner.

1.07 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner's Project Manager, Architect, and related subcontractors.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Bathroom accessories shall be Contura Series, manufactured by Bobrick Washroom Equipment Co., or equal by ASI or A&J Washroom Accessories, if they meet or exceed the requirements of these specifications.

2.02 MATERIALS

A. Stainless Steel shall be AISI type 302/304, with NAAMM no. 4 satin finish, 22 gauge minimum.

B. The galvanized sheet steel shall be G60, in accordance with the requirements of ASTM A 527.

C. Chromium plating shall be nickel and chromium electro-deposited on base metal of steel or brass, in accordance with requirements of ASTM B456, Type SC2.

D. Provide exposed fasteners finished to match accessory. Where concealed provide galvanized fasteners and mounting kits of type to suit accessory and wall condition.

E. Recycled Content: 50-70 percent Pre-Consumer.

2.03 FABRICATION

A. Fabricate accessories to be straight, plumb, level, and square with uniform, tight joints, and smooth and rounded edges.

B. Bathroom Accessories shall be based on Bobrick "Contura" line, or as otherwise approved by the Architect. Provide units to sizes, shapes, and profiles indicated on approved shop drawings.

C. Provide anchorage arrangement which is fully concealed when unit is closed.

D. Provide continuous stainless steel piano hinges for all accessories that open.

E. Do not apply, stamp, or engrave any trademark, trade name or manufacturer's name on exposed surfaces.

F. Provide locks for all accessories that open and provide two keys for each lock. Key all accessories the same.

3.01 SCHEDULE OF ACCESSORIES

A. Toilet Accessories Schedule:

1. Provide accessories in accordance with the Toilet Accessories Legend included at the end of this Section.
2. All toilet rooms and individual stalls shown in the Drawings shall be provided with toilet accessories in accordance with the Toilet Accessories Legend.
3. The Trade Contractor of this Section shall install toilet accessories and janitorial accessories as provided and directed by the Owner in accordance with the Contract Documents.

B. Provide one 30 in. long, Janitor's Utility Unit, Bobrick No. B-224, or equal in Janitor Closets, Maintenance Storage Rooms, Receiving, and Boiler Room.

C. Provide horizontal wall mounted baby changing station with stainless Steel Veneer, KB200-05SS White Granite, as manufactured by Koala Kare or equal.

D. Schedule of Accessories:

TAG	MODEL	DESCRIPTION	ACTION
1. A1	B-264	Toilet Tissue Dispenser	2
2. A2	B-6806	Grab Bars; one set per HC toilet	2
3. A3	B-4112	Liquid Soap Dispenser	2
4. A4	B-166-2436	Mirror / Shelf	2
5. A5	B-369	Surface Mounted Paper Towel Dispenser and Waste Receptacle	2
6. A6	B-4353	Surface Mounted Sanitary Napkin Disposal	2

E. General Note:

1. Action 1: Supplied by Owner and installed by General Contractor
2. Action 2: Supplied and Installed by Toilet Accessory Subcontractor

2.04 MIRROR / SHELF

A. Provide 24 in. x 36 in. mirror / shelf combination, Model No. B-166-2436 as manufactured by Bobrick or equal by ASI or A&J Washroom Accessories. The mirror shelf shall comply with the following properties:

1. Style: Mirror with 5 in. deep shelf
2. Type: Channel Frame
3. Material: Stainless Steel

4. Glass Type: Plate glass
5. Description: Fixed
6. Color: Clear

PART 3 - EXECUTION

3.02 INSTALLATION

A. Strictly comply with manufacturer's instructions and recommendations, except where more restrictive requirements are specified in this Section. Beginning Work means Installer accepts substrates and conditions.

B. Securely install at heights and locations indicated or if not indicated, at heights and locations as field directed by Architect. Where toilet room is indicated to be handicapped accessible, install toilet accessories at locations and heights required by authorities having jurisdiction for handicapped accessibility approved by the Architect.

3.03 ADJUSTING, CLEANING, PROTECTION

A. Adjust operating parts to Work easily, smoothly, and correctly.

B. Repair minor damage to all Work of this Section, including coatings and finishes, to eliminate all evidence of repair. Remove and replace Work which cannot be satisfactorily repaired, as determined by the Architect.

C. Provide temporary protection to ensure Work being without damage or deterioration at time of final acceptance. Remove protections and re-clean as necessary immediately before final acceptance.

3.04 RUBBISH REMOVAL

A. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION

SECTION 14 24 00

HYDRAULIC ELEVATOR
(Filed Sub-Bid Required)

PART 1- GENERAL

1.01 Related Documents:

A. The Contract Documents include the Drawings as enumerated on the Title Drawing, the general provisions of Contract, including General and Supplemental Conditions, and the provisions of this Project Manual and Addenda represent and describe the work and requirements of the Project.

1.02 Filed Sub-Bid Requirement:

A. The Work of this Section is stipulated as a Filed Sub-Bid under Paragraph D, Item 2 of the Form for General Bid.

B. The Sub-Bidder of this Section shall submit Section 00 03 25 – Form for Sub-Bid as required by Section 44F of Chapter 149 of the General Laws, as amended.

C. The Sub-Bidder of this Section is directed to Section 00 01 00 – Instruction to Bidders. All Sub-Bids shall be filed with the Awarding Authority in accordance with requirements stipulated therein.

D. The Sub-Bidder of this Section shall include the Work of the following Section.

1. 14 24 00 Holeless Hydraulic Elevator

E. The Sub-Bidder of this Section shall examine Work primarily shown on the following drawing:

1. VT.01: Elevator #1- Plan and Sections

F. The Sub-Bidder of this Section shall examine other specification sections and other drawings that could affect the Work of this Section as it relates to coordination.

1.03 This Section Includes:

A. Section 14 24 00 Hydraulic Elevator.

1. One (1) Twin Post Holeless Hydraulic Elevator.

B. Drawing Sections:

1. VT.01: Elevator 1 - Plans and Section

C. Related Specification Sections:

1. Section 04 Masonry
2. Section 05 Structural Steel
3. Section 08 Doors and Frames
4. Section 09 Painting
5. Section 22 Plumbing
6. Section 23 HVAC
7. Section 26 Electrical

1.04 Description of Work

A. Provide labor, materials, and equipment necessary to complete the work of this section to install One (1) holeless hydraulic elevator.

B. The Elevator Contractor shall bear the responsibility of coordinating all his work in conjunction with related work specified elsewhere in performing the work specified herein.

C. In general, the contractor shall be responsible for, but not limited to the following:

1. The Work to be performed under this Section 14 24 00.
2. Providing shop drawings and samples.
3. Providing record “As-Built” drawings.
4. Providing a complete elevator installation in accordance with all codes and regulations.
5. Provide in base bid coordination and access for related work requirements.
6. Provide clean down prior to acceptance testing.
    a. Provide complete and final clean down of all elevator equipment, machine room, hoistway and pit at completion of building construction and prior to building occupancy.

D. The requirements on the Drawings shall apply to the work of this Section.

E. Work included:

1. Labor, materials, equipment and services necessary for complete safe installation in accordance with all regulatory codes including, but not limited to, the following specification sections of the contract documents:

a. General Provisions for Hydraulic Elevator Work.

b. Hoistway Equipment for Hydraulic Elevator Work.

c. Machine Room Equipment for Hydraulic Elevator Work.

d. Operating System for Hydraulic Elevator Work.

e. Signal System for Hydraulic Elevator Work.

f. Communication System for Hydraulic Elevator Work.

g. Car Equipment for Hydraulic Elevator Work.

h. Doors and Door Equipment for Hydraulic Elevator Work.

i. Firefighters' Service for Hydraulic Elevator Work.

j. Elevator Emergency Power Connection.

k. Pit Ladder coordination. Provide direction to related trade.

l. Keyed Security Lock Out. (To be Determined)

m. Camera wiring provisions (camera provided by others)

n. Elevator Flooring.

2. Cutting and patching except as noted in Supplementary Conditions for Mechanical and Electrical Work.

3. Provide in Machine Room approved cabinet for all parts, prints, liquids and manuals.

4. Shop drawings and samples.

5. Record "As-Built" drawings:

a. As herein noted.

b. As noted in Division 1, General Requirements.

6. Full Preventive Maintenance and Warranty Coverage:

a. At completion, acceptance and certification of the elevator, it will be covered by Full Preventive Maintenance coverage.

F. Related work specified elsewhere, including but not limited to:

1. Hoistways, pits, machine rooms.

2. Smoke holes, secured gratings.

3. Louvers, screens.

4. Lighting of pit and machine room.

5. Ventilating of hoistway and machine room.

6. Access and guards.

7. Supports for guide rail brackets, buffers, and entrance sills.

8. Installation of pipe sleeves.

9. Installation of inserts.

10. Electric feeders to disconnect switches or circuit breakers and to elevator starter and/or control panels, electric circuits to disconnect switches and to elevator relay panel.

11. Properly grounded disconnect switch in machine room and wiring to the controller.

12. Separate fused lockable 110 Volt disconnect with wiring to controller for car lighting and car fan.

13. Conduit to remote locations for elevator intercommunication and alarm systems, if applicable.

14. Indicated or required chases, openings.

15. Finish painting except as noted.

16. Guarding, protecting hoistway during construction.

17. Storage space for tools, materials.

18. Electric power for testing, adjusting equipment.

19. Metal gratings.

20. Telephone raceway systems.

21. Dedicated Telephone Line and telephone jack to elevator machine room.

22. Grouting under entrance sills and around frames.

23. Photoelectric detectors.

24. Signal from fire alarm system.

25. Circuitry in disconnect for Battery Lowering.

26. Provide in the Machine Room 115 VAC, 275 Watt, GFCI receptacle in proximity

to hydraulic reservoir tank unit for hydraulic tank heater (tank heater provided by Elevator Contractor).

27. Provide in Pit area a 115 VAC, 275-Watt, receptacle for Oil Return Scavenger system (Oil return system provided by Elevator Contractor).

28. Floor drain/sump in pit.

29. Security camera.

1.05 References

A. Labor, material, equipment, services necessary for complete, safe installation in conformity with:

1. American National Standard, Safety Code for Elevators and Escalators (ASME A17.1-2013) as modified by MA 524 CMR and Section 35.00, June 1, 2018 version.

2. Commonwealth of Massachusetts, Board of Elevator Regulations 524 CMR and 521 CMR, AAB, Architectural Access Board.

3. National Building Code (NBC).

4. Uniform Building Code (UBC).

5. American National Standard Specifications for Making Buildings and Facilities Accessible to And Usable by Physically Handicapped People (ANSI A117.1), and Americans For Disabilities Act (ADA).

6. Earthquake provisions as required by Local Code.

7. All National and Local Codes.

8. Authorities having jurisdiction.

1.06 Definitions

A. Specifications are of simplified form and include incomplete sentences. Words or phrases, such as "The Contractor shall," "shall be," "provide," "furnish," "a," "an," "the," and "all" have been omitted for brevity.

B. Additional definitions

1. "Approved," "satisfactory," "accepted," or "directed": as approved, satisfactory, accepted or directed by or to Engineer and/or Owner.

2. "Callback:" In contract service, a customer request which requires a check of an elevator other than the regularly scheduled examination.

3. “Completion, Final”: Full completion, including all punch list items and commencement of one-year warranty/maintenance coverage.

4. "Completion, Substantial": Completion of all work. Certification by the Department of Public Safety and return of full use by Owner.

5. "Concealed": embedded in masonry or other construction, installed in furred spaces, within double partitions or hung ceilings, in trenches, in crawl spaces or in enclosures.

6. "Exposed": not installed underground or "concealed" as defined above.

7. "Indicated," "shown," or "noted": as indicated, shown or noted on drawings or specifications.

8. "Install": to erect, mount and connect complete with related accessories.

9. "Provide": to supply, install and connect up complete and ready for safe and regular operation particular work referred to unless specifically indicated otherwise.

10. "Repair:" A scheduled work order as a result of a 'callback', or recommendation, etc.

11. "Similar or "equal" of approved Bidder, equal in materials, weight, size, design, and efficiency or specified product, conforming with Base Bid Manufacturer" approved by Engineer and Owner.

12. "Supply": to purchase, procure, acquire and deliver complete with related accessories.

13. "Wiring": Elevator conduit, fittings, wire, junction and outlet boxes, switches, cutouts, receptacles and related items.

14. "Work": labor, materials, equipment, apparatus, controls, accessories, and other items required for proper and complete installation.

1.07 Quality Assurance

A. Elevators: product of individuals, firms or corporations regularly engaged in manufacturing elevators comparable with this contract and in satisfactory operation for period of not less than five years.

B. Operation performance:

1. The control systems shall provide smooth acceleration and deceleration with leveling accuracy at all landings from no load to full rated load in the elevator.

C. Quality and gauges of materials.

1. New, best of their respective kinds, free from defects.

2. Materials, equipment of similar application; same manufacturer, except as noted.

3. Gauges as noted.

4. Secure review of materials, equipment and installation.

1.08 Warranty

A. Warranty:

1. Elevator.

2. Associated equipment.

B. Warranty against:

1. Defective material.

2. Imperfect work.

3. Faulty operation.

C. Warranty period:

1. Continue in effect for one (1) year at the completion, acceptance and certification of the elevator by the Department of Public Safety, Elevator Division.

2. Full preventive maintenance service to continue uninterrupted and coincide with the one-year warranty period.

D. Repair or replace defective work at no additional cost to Owner.

E. Exceptions:

1. Parts damaged by parties other than Contractor through:

a. Misuse.

b. Accident.

c. Negligence.

1.09 Equipment and Service Manuals

A. Equipment Brochure and Service Manuals:

1. Before requesting acceptance of work, furnish as required sets of manufacturer's equipment brochures consisting of:

a. Equipment and components, descriptive literature.

b. Performance data, model number.

c. Vendor and equipment detail.

d. Hydraulic detail.

e. Spare parts lists.

f. Detailed, record and as-built layout.

g. Detailed, simplified, one line, wiring diagrams.

1) Provide complete sets of "as-built" field wiring and straight-line wiring diagrams showing all electric circuits in the hoistway as well as the machine room. One set of diagrams shall be stored in a fire-resistant cabinet in the elevator machine room.

2) Remaining sets, each bound in durable binders. These sets may be incorporated with "Equipment Brochure and Service Manuals".

h. Assemble manufacturer's equipment manuals in chronological order following the specification alpha-numerical system using heavy duty three ring binders.

i. Field test reports.

j. Submit valve tag chart indicating size, type, location, system and number of all valves.

B. Solid State Diagnostic Tools:

1. The elevator control equipment for all elevators will contain diagnostic capabilities required for the ease of complete maintenance of all aspects of the control, dispatch systems and solid-state motor drive units.

2. The diagnostic system shall be an integral part of the controller and provide user-friendly interaction between the serviceman and the controls.

3. All such systems shall be free from secret codes and decaying circuits that must be periodically reprogrammed by the manufacturer.

4. Systems that require hook-up of external devices for troubleshooting are not acceptable.

1.10 Maintenance Schedule

A. Full Preventive Maintenance Service:

1. Provide in Base Bid Full Preventive Maintenance Program for one complete year after the completion of the elevator.

2. To commence upon completion, testing, acceptance, and certification of all elevator Work by the State Elevator Inspector and to continue in full force until one year after state acceptance test date of the elevator.

3. Include:

a. Examination, adjustments, greasing, oiling, parts replacement due to normal

wear and tear use.

4. Cost adjusted to reflect Warranty.

   a. For the purpose of this agreement and subsequent adjustments, the straight time hourly rate for elevator mechanics shall be equal to the actual hourly rate paid to the elevator mechanics plus the fringe benefits granted in lieu of, or in addition to, hourly rate increases. Fringe benefits include, but are not limited to, pensions, vacations, paid holidays, group life insurance, sickness and accident insurance, and hospitalization insurance.

   b. Any change in prices under this provision shall not result in the payment of more than the maximum price permitted by any applicable legally issued government regulations in effect at the time such adjustment is made.

5. Full Service Contract – Following is provided as a guideline and shall include; but not be limited to:

   a. Hydraulic power unit and accessories: pump, motor, valves, operating valves, pulleys, drive belts, flexible hydraulic hose and fitting assemblies, oil tank, muffler, strainer, sound isolating coupling, plunger, packing gland, scavenger systems, piping and other components.

   b. Controller, Selector and Dispatching Equipment: all components including all relays, solid state components, resistors, condensers, transformers, contacts, leads, dashpots, computer devices, selector switches, mechanical or electrical driving equipment, coils, magnet frames, contact switch assemblies, springs, solenoids, resistance grids, hoistway vanes, magnets and inductors.

   c. Hoistway door interlocks or locks and contacts, hoistway door hangers and tracks, bottom door gibs, cams, rollers, and auxiliary door closing devices for power operated doors.

   d. Hoistway limit switches, slowdown switches, leveling switches and associated cams, vanes, and electronic components.

   e. Guide shoes including rollers or replaceable gibs.

   f. Automatic power operated door operators, door protective devices, car door hangers, tracks and car door contacts for both side slide and vertical bi-parting doors.

   g. Traveling cables. Check swing and sway. Repair, replace as required.

      1) Repair, replace, install new protective pads.

   h. Elevator control wiring in hoistway and machine room.

   i. Car safety mechanism and load weighing equipment.

   j. Buffers.

k. Jack Packings.

l. Fixture contacts, pushbuttons, key switches, locks, lamps and sockets of button stations (car and corridor), corridor lanterns, position indicators (car and corridor), direction indicators.

m. Telephone systems. Test and repair or replace.

n. Battery for emergency car lighting.

o. Emergency Battery Lowering.

p. The guide rails shall be kept free of rust. Where roller guides are used rails shall be kept dry and properly lubricated when sliding guides are used. Renew guide shoe rollers and gibs as required to ensure smooth and satisfactory operation.

q. Examine, and make necessary adjustments or repair to the following accessory equipment including relamping of signal equipment: corridor lanterns, car and corridor position indicators, car stations, traffic director station, electric door operators, interlocks, door hangers, safety edge, and intercom system.

r. Examine regularly and systematically all safety devices, and conduct an annual no load test, and each fifth year perform a full load, full speed test of safety mechanism, car buffers. The car balance shall be checked. All tests shall be performed in accordance with the provisions of the American National Standard, Safety Code for Elevators and Escalators (ASME A17.1), current edition, as modified by 524 CMR.

1) Conduct Pre-Inspection Checklist.

s. Repair or replace conductor cables and hoistway and machine room elevator wiring.

t. Maintain all elevator equipment in hoistways, machine rooms, and pits in a clean orderly condition, free of dirt, dust and debris.

u. Furnish lubricants compounded specifically for elevator usage.

v. Testing of firefighters' service by keyed switch operation in accordance with A17.1.

6. The Elevator Contractor shall not be required to install new attachments on the elevator whether or not recommended or directed by insurance companies or by governmental authorities, nor to make any replacements with parts of a different design. The Contractor shall not be required to make renewals or repairs necessitated by reason of negligence or misuse of the equipment or by reason of any other cause beyond the contractor's control except ordinary wear and tear unless the Contractor receives just compensation.

7. The Elevator Contractor shall not be responsible for the following items of elevator equipment: car enclosure (including removable panels, door panels, car

gates, plenum chambers, hung ceilings, light diffusers, light tubes and bulbs, handrails, mirrors and carpets): hoistway enclosure: hoistway doors (unless due to maintenance deficiencies), frames and sills.

8. All call-back work is to be performed during regular working hours of regular working days. Emergency call-back calls shall be answered at all hours of the day or night as requested. Should overtime emergency calls (Call backs) be required, these calls shall be billed at Bonus Time Only.

9. Emergency call back response to be within one (1) hour on site.

10. The Contractor shall check the dispatching system and make necessary tests to ensure that all circuits and time settings are properly adjusted, and that the system performs as designed and installed.

    a. Repair or replace conductor cables and hoistway and machine room elevator wiring.

    b. Maintain all elevator equipment in hoistways, machine rooms, and pits in a clean orderly condition, free of dirt, dust and debris.

B. Repair Work and Compensation for Repair Work:

1. Repair Work:

    a. Repair work conducted during regular working hours included in the scope of the contract.

2. The Contractor will begin on site within 24 hours all necessary repairs and replacements due to ordinary wear and tear.

3. Compensation for Repair Work

    1) All Repair Work will be performed where possible during regular working hours of regular working days (8:00 a.m. to 4:30 p.m., Monday through Friday). No additional compensation will be paid for Repair Work performed during these working hours.

    2) When Repair Work must be performed outside of these working hours, prior approval shall be obtained from the Owner. When Repair Work is performed at the request of the Owner outside these working hours, the Contractor's compensation will be increased by only the following amounts:

        a) In the case of materials, no additional amount will be allowed.

        b) In the case of labor, only the premium portion of the Contractor's standard overtime billing rate will be billed.

    3) A separate monthly invoice under this Article will consist solely of the cost of labor for Repair Work as determined in this article.

4) When Repair Work is performed for the convenience of the Contractor outside of these working hours, the Contractor's compensation will not be increased.

4. Access to Records:

a. The Contractor will provide, when requested, all records and documents in possession of the Contractor, relating to labor expended and material used in the performance of Repair Work, for which the Contractor has been or is to be compensated according to the method described in the paragraph above. Such records and documents will be limited to time tickets and records or replacement parts with the published price lists of the contractor.

5. Repair Work Procedures:

a. Whenever any Repair Work is to be performed by the contractor that will require additional compensation, an estimate of the additional compensation and out-of-service time will be submitted to the Owner, who will give written approval to the contractor. In the case of an emergency, verbal approval from the owner will suffice.

b. Such approval of the Repair Work, in accordance with the terms of this agreement, will entitle the Contractor to compensation in addition to the monthly payments for maintenance if the work is to be performed in other than regular hours.

c. The Contractor will, as a condition of payment for such work, furnish to the Owner at the end of each week daily time slips showing (1) the time and number of each workman employed on such work, (2) the number of hours daily which he is employed thereon, and (3) a brief description of the nature of the work performed. Such weekly time slips are for the purpose of enabling the Owner to determine the accuracy of the amounts to be paid to the Contractor for Overtime Repair Work.

C. Extra Work and Compensation for Extra Work

1. Extra Work Definition:

a. Work above the scope of the contract.

b. The contractor will be on site within 24 hours to conduct all repairs and replacements, and the Owner will pay the contractor, in addition to the monthly price for maintenance, for such proportion of material and labor cost of any repairs and replacements that are necessitated directly by negligence, misuse, accidents, fire, flood, vandalism or abuse which are not the fault of the Contractor.

1) Contractor is to review these Extra Work items directly with the Owner.

2. Replacement of Materials for Extra Work:

a. Where it is necessary for the Contractor to replace any item of material

during the performance of Extra Work under this agreement, the contractor will first submit to the Owner for approval the name of the item or items, the quantity needed, and the material price that the Owner is to be billed. In case of an emergency, verbal approval from the Owner may suffice.

3. Compensation for Extra Work:

    a. The Owner and the Contractor will mutually determine the amount of payment for Extra Work by the Contractor. The amount of payment shall be calculated based on the material and labor used to perform the Extra Work.

    b. The separate monthly invoice under this Article will consist of the cost of repairs or replacement as noted above.

    c. When Extra Work is performed for the convenience of the contractor outside of the regular working hours of regular working days, the Contractor's compensation shall be limited to the straight-time portion of labor cost. The Contractor will be compensated for overtime hours only upon prior approval by the Owner.

4. Extra Work:

    a. The Contractor will provide, when requested, all records and documents in possession of the Contractor directly relating to labor expended and materials used in the Performance of Extra Work (time and material basis) for which the contractor has been or is to be compensated, according to the method described above.

        i. Such records and documents will be limited to time tickets and records of replacement parts with the published priced lists of the Contractor. Certification of other costs will be provided by independent auditors of the contractor's and Owner's choosing at the Owner's request. This audit will be compensated for separately by the Owner.

        ii. If certain materials manufactured by the Contractor do not appear on published priced lists, the Contractor may be requested to display evidence that the charges to the Owner are comparable to those that are being offered to other similar customers of the Contractor.

5. Extra Work Procedures:

    a. Whenever any work is to be performed by the Contractor, an estimate of additional compensation and out-of-service time will be submitted to the Owner, who will give approval to the contractor prior to start of Extra Work.

6. Such approval of the Work, in accordance with the terms of this agreement may entitle the Contractor to monthly compensation. The Contractor will, as a condition to payment for such work, furnish to the Owner, for the purpose of auditing, at the end of each week, daily time slips showing (1) the number of hours daily which the Contractor has employed thereon, and (2) a brief

description of the nature of the work performed, and a list of material used. Such weekly time slips are for the purpose of enabling the Owner to determine the accuracy of the amounts to be paid to the Contractor.

D. Maintenance Responsibility.

1. The Contractor shall keep the elevator maintained to operate at the original contract speed, keeping the original performance time, including acceleration and retardation as designed and installed by the manufacturer. The door operation shall be adjusted as required to maintain the original door opening and door closing times, within legal limits.

2. The Owner reserves the right to make inspections and tests as and when deemed advisable. If it is found that the elevator and associated equipment are deficient either electrically or mechanically, the Contractor will be notified of these deficiencies in writing, and it shall be his responsibility to make the necessary corrections within 30 days after his receipt of such notice. In the event that the deficiencies have not been corrected within 30 days, the Owner may terminate the Contract and employ a Contractor to make the corrections at the original bidder's expense.

3. Approximately three months prior to the end of the contract term, the Owner may make a thorough maintenance inspection of the elevator covered under the contract. At the conclusion of this inspection, the Owner shall give the Contractor written notice of any deficiencies found. The Contractor shall be responsible for correction of these deficiencies within 30 days after receipt of such notice.

4. Access to the equipment for review purposes is the responsibility of the elevator contractor.

5. In sufficient time prior to the end of the one (1) year warranty maintenance period, pay and file annual (or five year) state test permit and test the elevator. Annual testing of elevator is to be conducted in sufficient time to allow for correction of any citations before the completion of the final one (1) year warranty maintenance period.

6. Conduct Pre-Inspection Checklist in accordance with MA 524 CMR.

7. Any citations to be immediately corrected by elevator contractor.

8. All costs for repair permits are the responsibility of the Elevator Contractor.

9. It is the Elevator Contractor's responsibility to ensure that a report documenting the date of the annual safety test as well confirmation of the results of the test be made available to the Owner.

10. It is the Elevator Contractor's responsibility to obtain a copy of the Certificate of Use for the Owner and to post the Certificate of Use in the elevator.

1.11 Equipment and Materials

A. Guards and Railings:

1. Provide OSHA approved guards for rotating equipment.

2. Furnish guards, railings as indicated and/or as required by Authorities.

3. 4” Minimum Toe Boards as required on car top railing.

B. Nameplates:

1. In addition to manufacturer's standard identification plates provide:

a. Fastened with epoxy cement, screws or rivets, engraved, black sheet with 3/4-inch white lettering.

b. Inscription: subject to review, indicating equipment and voltage.

c. Provide for:

1) Disconnect switches.

2) Control panels.

3) Selector panels.

4) Pumps.

5) Motors.

1.12 Product Delivery, Storage and Handling

A. Moving of equipment:

1. Ship in crated sections of size to permit passing through available space. Contractor will survey existing buildings to observe access to hoistway and machine room.

2. Contractor must obtain approval of time for delivery and routes to bring in equipment and material from Owner.

3. Storage of equipment and materials shall be coordinated with Owner.

1.13 Cleaning

A. Brush and clean work prior to concealing, painting, acceptance.

B. Paint exposed work soiled or damaged: clean, repair to match adjoining work before final acceptance.

C. Remove debris from inside and outside of materials and equipment.

1.14 Painting

A. Painting as follows:

1. Paint:
    a. Best grade for purpose; rust inhibitive.
    b. Deliver in original sealed containers.
    c. Apply in accordance with paint manufacturer's instructions.
    d. Color: as directed by architect.
    e. Provide MSDS. Update as required.
2. Preparation:
    a. Clean, degrease, deburr.
3. Motors, machinery:
    a. Finish smooth.
    b. Prime coat equipment, fill and finish coat in factory.
    c. Machine room equipment, pit equipment and non-plated surfaces (not applicable to polished, milled surfaces, faces of guide rails).
4. Elevator structural steel, miscellaneous iron, sheet metal:
    a. Repair scratches and other damage in field. Use same prime finish materials.

1.15 Field Quality Control

A. Tests
1. Perform as hereinafter noted and in presence of:
    a. Authorities having jurisdiction.
2. Provide required labor, material, equipment and connections.
3. Document results, submit for review.
4. Repair or replace defective work, as directed.
5. Pay for restoring or replacing damaged work due to tests, as required and as directed.

B. Prior to expiration of one-year warranty/maintenance service included in contract, make a thorough check of:
1. Car rails, car sling, roller guides.

2. Door Operation.

3. Car alignment and operation.

4. Hydraulic systems.

5. Hydraulic packings.

6. Car doors and landing doors.

7. Make adjustments as required for a car ride acceptable to Owner.

8. Entire elevator system.

C. Noise and vibration.

1. Due to faulty equipment or workmanship: correct as required and directed without additional charge.

2. Provide isolation for all panels, pump units, etc. Provide all sound suppression equipment to ensure noise and vibration free operation.

1.16 Schedule

A. Holeless Hydraulic Elevator (Refer to VT.01)

1.	Elevator Designation	Passenger
2.	Contract Load in Pounds:	3,500
3.	Contract Speed in FPM:	100
4.	Number of Stops:	1, 2, 3 (Front & Rear)
5.	Number of Openings:	Refer to VT.01
6.	Machine location:	Above Hoistway
7.	Machine type:	Hydraulic Power Unit
8.	Operation:	Simplex, Selective Collective
9.	Motor Horsepower:	Refer to VT.01
10.	Hoistway Size:	Refer to VT.01
11.	Platform (Outside)	Refer to VT.01
12.	Car (Inside):	Refer to VT.01
13.	Car and Hoistway Door Size:	Refer to VT.01

14.	Cab Height:	8'-0"
15.	Car and Hoistway Type:	Single Speed Side Opening Front and Rear
16.	Travel:	Refer to VT.01
17.	Door Reversal Device:	'Green'/'Red' Detector
		Electronic Door Detector
18.	Car Operating Panel:	Main and Auxiliary, Vandal Proof Design
19.	Call Registration Indicator (in car):	Required
20.	Car Position Indicator (in car):	Required
21.	Corridor Position Indicator at Main Landing:	Required (L.E.D. Lights)
22.	Corridor Call Buttons, Call Registration Lights:	Required (L.E.D. Lights)
23.	Keyed Lock Out:	Car and Hall (To be Determined)
24.	Car Travel Arrow:	In Car Jamb
25.	Self-leveling:	Required
26.	Telephone	Self-Dialing, Required
27.	Firefighters' Service	Required
28.	Medical Emergency	Required
29.	Emergency Operation	Emergency Battery Rescue
30.	Telephone Monitoring	Required

PART 2- PRODUCTS

2.01 Description

A. The Work specified pertains to one (1) Twin Post Holeless Hydraulic Elevator complete with all car, hoistway, machine room and pit equipment.

2.02 General Hoistway Equipment

A. Complete hoistway, machine room and pit required appurtenances.

2.03 Submittals

A. Shop drawings:

1. Dimensional drawings indicating:

a. Hoistway and equipment.

b. Supports of equipment.

c. Reactions.

d. Weights of equipment.

e. Specification, electrical and BTU data.

f. Machine Room and equipment.

g. Clearances around equipment.

2.04 Seismic Design Protection

A. Elevator to be designed to provide protection during seismic activity.

B. The elevator safety requirements for Seismic Design Category (SDC) ‘B” or as designated and in accordance with ASME A17.1, Part 8.4 and MA 524 CMR, Section 35.00 to include but not be limited to the following:

1. Guarding of Equipment:

a. As required by Code.

b. Snag points

1) Snag points created by rail brackets, rail clip bolts, fishplates, names and similar devices shall be provided with guards to prevent snagging of traveling cable.

2.05 Equipment Material

A. Holeless Hydraulic Elevator

1. Twin Post Holeless Hydraulic jack unit.

2. As required, two jacks piped together, mounted one on each side of the car with each having telescopic sections designed to extend in a synchronized manner when oil is pumped into the assembly.

3. Each jack section will be guided from within the plunger assembly used to house the section.

4. Each plunger shall have a high pressure sealing system which will not allow for seal movement or displacement during the course of operation.

5. Each jack assembly shall have a check valve built into the assembly to allow for automatic re-synchronization of the plunger sections by moving the jack to its fully corrected position.

6. The jack shall be designed to be mounted on the pit floor.

7. Each jack section shall have a bleeder valve to discharge any air trapped in the assembly.

8. Cylinder:

a. Steel pipe.

b. Thickness to sustain 400 psi test.

c. Built-up construction.

d. External couplings.

e. Fit with cylinder head, incorporating:

1) Adjustable packing gland prevent excessive oil leakage, easily repackable. Provide means to release air from cylinder.

2) Bronze bushing.

3) Strike, for plunger stop collar.

4) Supports.

f. Oil Recovery Unit:

1) Provide in Pit.

2) Collection groove and coupling with runoff tube.

3) Oil collection unit and tubing shall collect oil from cylinders.

9. Plunger:

a. Selected steel tubing.

b. Diameter as approved.

c. Turned true, polished.

d. Built-up construction.

e. Internal couplings.

B. Guide rails and brackets:

1. Planed steel, standard T-section.

2. Extend from pit floor to underside of concrete slab or grating at top of hoistway.

3. Brackets adjustable for width wise and depth wise position.

C. Guides:

1. Mount on top and bottom of car.

2. Roller type:

a. Three ball bearing rubber or composition tire wheels, with adjustable springs or other method subject to review, to maintain rail contract.

b. Suitable for operation on dry unlubricated guide rails.

D. Buffers:

1. Type: Spring

2. Stroke: as required by Code.

3. Pipe struts and braces as required.

4. Locate in pit under car.

5. Mount on continuous channels secured to guide rails.

E. Automatic terminal stopping devices:

1. To stop car at top and bottom landings.

2. Independent of regular operating device.

3. Provide final limit switches:

a. To stop car that has traveled beyond zone of normal stopping devices.

b. Prevent operation of elevator until reset.

c. Operated by elevator car.

F. Pit Stop Switch and Pit Ladder:

1. Provide stop switch in pit adjacent to point of access to pit.

a. Provide in accordance with code.

2. Pit Ladder

a. Pit ladder provided by others.

b. Elevator Contractor to provide coordination to ensure in accordance with code regulations.

2.06 Installation

A. Cylinder and plunger:

1. Plunger, plumb with elevator at any elevation.

B. Guide rails:

1. Erect plumb and parallel, maximum deviation 1/8 inch.

2. Support to prevent distortion by eccentric loading.

3. Provide rail backing when bracket spacing exceeds 8'-0" or Code recommended maximum.

2.07 Quality Assurance

A. Speed regulation:

1. Rate of change:

a. Constant.

b. Independent of car operating device.

2. Speed: Plus or minus five percent of specified.

2.08 Equipment and Material

A. Power Unit:

1. Including:

a. Oil storage tank: (Submersible)

1) Steel: Welded, reinforced, constructed of 12-gauge.

2) Cover: Removable.

3) Removable oil dip stick and visual oil gauge.

4) Provided with:

a) Protected vent opening.

b) Overflow connections.

c) Capacity: To lift elevator to top landing plus minimum of 10 gallons.

d) Surge control shall prevent oil leaving tank when elevator descends.

e) Oil supply: To raise elevator to top landing plus minimum of 10 gallons.

f) Viscosity as required by pump, environmental conditions.

g) Provide oil heater in tank, to insure constant oil temperature and proper operation of elevator. Elevator shall not be affected by temperature variations.

h) Provide hydraulic oil.

i. Confirm and provide oil in accordance with manufacturer's specifications and requirements for viscosity.

b. Provide Neoprene vibration isolation pads (6"x4"x1 ¼" or as recommended)

c. Oil pump:

1) Positive displacement.

2) Screw or gear type.

a) Accurately cut herringbone or helical gears.

b) Case accurately machined, close fitting to gears.

c) Operate under flooded suction.

3) Induction motor driven.

4) Mount pump and motor on common bedplate with sound, vibration absorbing devices and reinforced isolation mount.

5) Provide with permanent plate stating oil viscosity.

d. Electric motor: AC, polyphase, squirrel cage induction type, designed for electro-hydraulic requirements.

e. Pump drive:

1) Submersible

a) Pump and motor mounted on reinforced isolation.

b) Designed and manufactured for elevator service.

c) Positive displacement screw type to give smooth operation.

f. Control valves:

1) Main and leveling.

a) Magnetic type.

b) Positive operation.

c) Mounted in discharge line above oil level and easily accessible.

2) Relief.

3) Check.

4) Manually operated lowering valves, gate type.

5) Rupture Valve.

g. Air-bladder silencer provided at the control valve discharge.

h. Hydraulic piping:

1) Steel or wrought iron.

2) Screw type or Victaulic grooved.

3) 400 psi test minimum.

4) Provide with:

a) Blow-out proof muffler and sound isolating coupling.

b) Minimum of two gate valves, one in pit; one in machine room.

c) Oil pressure gauge with gate valve in line.

d) Sleeves, when passing through walls: Minimum one-inch clearance between piping and sleeve filled with fiberglass packing, both ends sealed with fireproof, non-hardening mastic, 1/4-inch minimum thickness. Sleeves supplied by Elevator Contractor, installation under Related Work Specified Elsewhere.

B. Controller:

1. Controller to be solid state microprocessor design.

a) As applicable, provide auto synchronization in accordance with manufacturer's recommendations.

2. Controller requiring plug-in diagnostic tooling or devices is not acceptable.

3. Panel:

a. Insulated, secure to steel frame.

b. Enclose in steel cabinet, with swing front doors.

c. Provide with:

1) Pump motor starter, electronic Soft Start.

2) Electromagnetic control switches and auxiliaries.

3) Automatic self-leveling.

a) Two way leveling and releveling within 1/4 inch.

b) Releveling: with car and landing doors open or closed.

4) Overload relays with manual reset.

5) Sequence starting relays for multiple motor installations.

6) Two mainline switches.

7) Circuitry for Failure Protection, as specified.

8) Contacts to receive signal from Photoelectric (or other fire) detection system.

a) Identify each device on panel.

C. Selector:

1. Selector floor switches in elevator hoistway.

2. To govern:

a. Direction of travel.

b. Stopping.

c. Leveling.

d. Signal lantern lighting.

D. Wiring:

1. From control panels and relay panels to equipment and from hoistway junction box to elevator. Provide transformer for required relay panel control voltage.

2. Install in metal wireways and raceways with outlet boxes as specified under Electrical Work, except for trial cables and short connections.

3. Traveling cables: Underwriters labeled, fire and moisture resistant outer braid and steel supporting strand. Provide minimum 10 percent spares, not less than six wires.

4. Branch circuit and control wiring: TEW or THW insulation, 600 volts.

5. Telephone wiring: Shall meet telephone company requirements. In trail cable from hoistway junction box to car. From hoistway junction box to terminal box in machine integrity or wiring.

6. From shaft riser to door interlocks, SF-2 type or equivalent; maximum operating temperature, 392 degrees F. Terminations shall be insulated to maintain integrity of wiring.

7. Install short connections (non-moist locations) in flexible conduit.

8. Conduit: Galvanized steel.

9. Install green ground wire as required.

10. Traveling Cable

a. New traveling cables designed for elevator service in accordance with NFPA Standards.

b. The cables shall be sufficiently flexible to readily adapt to all changes in the position of the elevator car and hang straight without twist. The cables shall be capable of bending 360 degrees with an inside radius of one foot without any permanent set and without cracking of the outer covering. The open loop shall show no tendency to twist upon itself.

c. Traveling cables shall have non-metallic fillers and shall be suspended by Crosby clips or looping cable around supports.

d. In addition, Kellum grips shall be provided to reduce slipping of jacketing and conductors.

11. The traveling cables shall include telephone cabling and shall be properly supported. The terminal boxes shall have approved connection strips for connecting conductors and, in addition to said devices for connecting conductors, approved strain devices for connecting the supporting strands and relieving the conductors of the traveling cables of all strain.

12. The swing of the traveling cables shall be checked when the elevator is running and all shields and pads necessary to prevent chafing shall be installed. The loop in the traveling cables shall be not less than 2 feet unless otherwise approved.

13. The traveling cables and the corresponding groups of conductors connecting these cables to the control, signal, and car operating panels shall each contain at least 10 percent spare conductors, but not less than two spare conductors of the same size and type.

14. Each traveling cable conductor shall have a distinctive color-coded outer covering for identification. Terminal blocks shall have indelible identification numbers for each terminal connection.

15. Provide shielded wires for communication.

16. Additional Wiring Requirements:

a. Provide RG6U Coaxile Twisted Cable or as designated for provisions for future camera installation.

1) Camera and proper attachments provided by others.

2) Elevator Contractor to work with security/electrical contractor for installation of camera in cab.

2.09 Installation

A. Install equipment making full use of space available for maximum access to all equipment.

1. All equipment to be installed in conformance with code regulated clearances.

2.10 Field Quality Control

A. Tests

1. Acceptance test in accordance with A17.1 and MA 524 CMR.

B. Protection of equipment:

1. Fully protect equipment from time of delivery until machine room is weather-tight.

2. Power unit and controller shall be enclosed in plastic-type bag or approved equal prior to equipment installation.

2.11 Description

A. Complete operating systems, equipment and appurtenances:

1. Operating systems:

a. Simplex selective collective operation.

b. Independent service operation.

c. Top of car operation.

d. Operation of Elevator Under Fire or Other Emergency Conditions per Massachusetts Elevator Code.

e. Emergency car lighting and alarm bell system.

f. Failure protection operation.

g. Earthquake provisions in conformance with code.

2. Provide operation and equipment as required to meet all applicable accessibility Codes.

2.12 Submittals

A. Shop drawings:

1. Submit detailed dimensional drawings detailing:

2. Hoistway and equipment.

3. Supports of equipment.

4. Reactions.

5. Weights of equipment.

6. Electrical and BTU data.

7. Shop Drawings: Machine Room

8. Dimensional layout indicating:

9. Machine room and equipment.

10. Electrical Data.

11. Clearances around equipment.

12. Weights and supports for the equipment.

13. Reactions.

14. BTU and horsepower data.

15. Submit detailed drawings of all signal fixtures and cuts of all acceptable standard fixtures.

    a. Submit Electronic PDF.

16. Drawings, cuts: Completely dimensioned; indicated faceplate finishes, operating devices.

    a. Include type of construction in which fixtures will be installed including method of installation.

17. Submittals to have sufficient margin area for approval stamping.

2.13 Operating Systems

A. Simplex Selective Collective Operation:

1. Pressure of car or corridor button, other than landing at which car is standing, shall start car and cause car to stop at first landing for which call was registered, corresponding to direction of car travel.

2. Car shall stop at all landings where calls are registered, relating to travel direction.

3. Calls registered for opposite direction of car travel shall remain registered and be answered after car has completed its calls in direction of travel.

4. If no car buttons are pressed and car starts UP in response to several DOWN calls, car shall answer highest DOWN call first and then reverse to collect other DOWN calls.

5. Time limit relay shall hold car a few seconds at landing to enable passengers to enter and leave car. When car has answered farthest call this interval shall permit car button call to be registered to establish direction of travel, even though corridor call is registered far opposite direction of travel.

6. Doors open automatically when car stops at landing.

7. Doors close predetermined interval after opening unless closing is interrupted by car door reversal device or door open button in car.

8. Pressing of corridor button at floor where car is standing shall open doors.

9. Emergency stop switch: When activated shall cause car to stop.

10. Key operated inspection switch: takes car out of normal operation and permits slow speed operation for inspection.

11. Key operated independent service switch: takes car out of normal operation and gives attendant full control over starting, stopping and direction of travel from car buttons only. Car shall travel at contract speed and shall not respond to corridor calls.

12. Six (6) sets of keys to be provided to Owner at completion of work and certification of elevator.

    a. Light, Fan, Independent, Telephone Monitoring Alarm and any owner designated key.

B. Failure protection:

1. Operational failure protection:

    a. Control circuit designed to detect malfunction due to:

        1) Motor starter failure.

        2) Low oil in system.

        3) Car failure to reach a landing in up direction within a pre-determined time.

    b. Causes elevator to automatically descend to bottom landing.

C. Emergency Battery Lowering:

1. Emergency Battery Lowering to be provided on elevator.

2. Upon loss of power, Battery Rescue shall engage and lower the elevator to the bottom landing.

3. Elevator door shall open and then close and car shall remain at the landing with the doors closed.

4. Upon return of normal power, battery shall recharge and elevator shall be operational.

5. All systems and functions in accordance with code.

D. Top-of-Car Operation:

1. Operating device:

   a. UP/DOWN buttons, constant pressure type; EMERGENCY STOP button, momentary pressure type, in accordance with Code.

   b. When operated: Car to travel at reduced speed.

E. Operation of elevators under fire or other emergency conditions:

1. Phase I Emergency Recall Operation:

   a. Provide operation and equipment as required by governing Code (ASME A17.1- current code, Modified by 524 CMR).

      1) Elevator Contractor shall provide required relays, wiring, and terminal strips to receive signal from photoelectric detector, sprinkler or fire alarm systems.

      2) Photoelectric detector, sprinkler or fire alarm system devices, wiring, etc., and connection to terminal strips in elevator controller panel(s) are under Work Specified Elsewhere.

   b. Coordinate with fire alarm systems contractor.

2. Phase II Emergency In-Car Operation:

   a. Provide operation and equipment as required by governing code.

   b. All features, functions and operation to be in accordance with A17.1-current code, along with all modifications as stated in MA 524 CMR and all regulatory codes and authorities.

F. Medical Emergency Operation

1. Provide in accordance with code.

2.14 Equipment and Material

A. Car Operation:

1. Car operating panel (main and auxiliary):

   a. Stations to be identical in size.

   b. All buttons: stainless steel vandal proof positive stop design; high visibility L.E.D. light.

   c. EMERGENCY STOP switch (keyed).

   d. ALARM button.

e. Light switch.

f. Emergency light test switch.

g. Fan switch: two speed.

h. DOOR OPEN button.

i. Key operated inspection switch.

j. Key operated independent service switch.

k. Keyed lock out.

l. Emergency push button telephone programmed with audio message detailing location of elevator.

m. Fire emergency visual and audible signals and Firefighters' Operation Panel.

n. Medical Emergency Jewel and Key Switch.

o. All keying required per Massachusetts Elevator Code.

p. Digital position indicator.

q. Certificate Frame sized to accommodate MA Certificate of Use.

1) Located on Car Operating Panel.

r. All signage to be engraved including but not limited to:

1) No smoking

2) Capacity

3) Firefighters' Operation

2. UP and DOWN call registered buttons at all intermediate landings and single button at terminal landings.

3. All lights for buttons and signals to be high visibility LED.

4. No plastic lenses.

5. Keyed access switches as designated.

6. Provide equipment and operation to meet all applicable accessibility codes.

2.15 Description

A. Complete systems of signal equipment and appurtenances. All lights for signals and buttons to be high visibility LED. Buttons to be stainless steel:

1. Car position indicator.
2. Alarm bell.
3. Direction arrow in car jamb.
4. Hoistway access switches.
5. Corridor call pushbuttons. Stainless Steel button with LED illumination.
6. Faceplates to be finished in No.4 Satin Stainless steel.
7. All required signs to be engraved on signal fixture faceplate. Applied signs will not be acceptable.
8. All signage in accordance with MA 524 CMR.
9. No plastic lenses or buttons.

B. Provide equipment and operation as required to meet all applicable accessibility Codes.

2.16 Signal Fixtures

A. Car/Hall Position and Direction Indicator:

1. Digital type mounted in car station and main landing.
2. Include UP and DOWN digital indicators. No plastic indicators.
3. All lights to be high visibility LED.
4. Hall push buttons, upon activation, call registration to be clearly seen and registration of call readily identifiable.

B. Alarm bell:

1. Under Car Platform:
   a. Provide bell.
   b. Diameter: 6 in.
   c. Connect to Alarm pushbutton.
   d. Include wiring and transformers.

C. Hoistway Access Switches:

1. Top landing.

2. Bottom landing.

3. Operation and equipment as required by Code.

D. Corridor Call Pushbuttons:

1. Call register type, vandal proof positive stop design.

2. Stainless Steel button with LED illumination required.

3. Lights to be high visibility LED.

4. The centerline of the hall call pushbutton(s) shall be exactly 42 inches from the centerline of the single button (terminal floor).

E. Keyed Security Key Switch:

1. At each landing and in car operating panel provide an ‘off’ – ‘on’ key switch for security access to the elevator.

2. Key switch to be provided in each hall fixture and in car operating panel.

3. Key removeable in either position.

F. Firefighters' Recall Operation

1. Provide Firefighters' Recall Operation at designated landing in hall station.

2. Key Switch and Visual Fire Hat visual indicator.

3. Provide signage in accordance with MA Code and A17.1. All signage to be engraved.

4. All keying to be in conformance with MA 524 CMR.

G. Provide car travel arrows in the car jamb.

1. No plastic lenses.

2. Vandal proof.

3. Lighting to be LED.

4. Located in each car jamb.

5. Signals to be in accordance with ADA code.

H. Provisions for the handicapped

1. Provide for handicapped accessibility as required but not limited to the following:

2. Arabic Numerals and Braille Symbols: Provide raised Arabic Numerals 3/4 inch in height and Braille symbols corresponding to the numerals on the elevator buttons located immediately left thereof. The Braille symbols shall be placed to the left of the corresponding raised Arabic numerals, or where space does not permit, the Braille symbols shall be placed directly below the Arabic numerals. Other controls and emergency equipment shall be identified by raised symbols, including door open, door close, emergency alarm, emergency bell, emergency stop, and telephone.

   a. Locations of Numerals and Symbols: Passenger elevator door frames on all elevator floors shall have the number of the floor on which the frame is located designated Arabic numeral 2-1/2 inches in height of approximately 60 inches above the floor located on both sides of jamb so that it is visible from within the elevator. Braille symbols shall be placed directly to the left of corresponding raised Arabic numerals.

I. Medical Emergency

1. Provide Medical Emergency Key Switch and Jewel in main landing hall push button and car operating panel.

2. All functions and features to operate in accordance with code.

2.17 Communications

A. Communication system, complete with all equipment and appurtenances:

1. Provide as integral part of car station a hands free, push button telephone system.

   a. Pre-recorded phone message to contain elevator location/designation.

   b. Dedicated telephone line and telephone jack to be provided by others.

   c. Telephone to be programmed to telephone number as provided and directed by Owner.

B. Phone Line Monitoring System

1. In accordance with A17.1: 2.27.1.1.6, provide means to verify operability of the telephone line.

   a. Verification of telephone line operability shall be automatically performed.

   b. A minimum of one visual and one audible signal shall be provided for each group of elevators controlled by a “Fire Recall” switch.

   c. The visual signal shall be located in the hall push button station in the vicinity of the “Fire Recall” switch.

      1) Signal Labeled “ELEVATOR COMMUNICATIONS FAILURE”

         i. Illuminate intermittentness upon phone line failure.

ii. Continues to illuminate intermittently until phone line is functional.

d. Audible signal shall sound every 30 seconds.

1) Signal shall continue until silenced by authorized personnel or the telephone line is functional.

e. Periodic Verification shall be at least once on a daily basis.

2.18 Car Equipment

A. Elevator car frame, platform, toe guard:

1. Car frame and auxiliary supports.

a. Structural steel members.

b. Welded, riveted or bolted to form rigid unit.

2. Platform:

a. Designed for Class of loading specified.

b. Steel frame with steel subfloor or structural steel frame filled with:

1) Double wood flooring, each floor minimum 3/4 in. thick marine grade plywood.

c. Underside: Fire-proofed with minimum No. 27 USSG sheet steel.

d. Mount on neoprene pads.

e. Support pads with auxiliary steel, frame, fastened to car frame forming isolated cushion between car and frame.

3. Toe guard:

a. Minimum No. 16 USSG cold rolled sheet steel on entrance side.

b. Full width of entrance.

c. As required by Code.

4. Sill:

a. Extruded aluminum with approved non- slip surface.

b. Length to accommodate door in fully open position.

c. Minimum thickness 7/16 in.

d. Grooves machine planed, minimum guide clearance.

e. Machine rabbetted to receive toe guard.

f. Securely fastened to platform.

g. Shimmed to be level.

h. Parallel to centerline elevator guide rails.

B. Worklights and Receptacles:

1. On top of car and under platform:

a. Lamp socket

b. Duplex grounded receptacles.

c. Lamp wire guard.

C. Cab Enclosure:

1. Return Panel: Stationary reinforced front return panel set up to accommodate new car main operating panel. Finish to be #4 brushed stainless steel, 16 Ga.

2. Strike Jamb: Reinforced strike jamb and entrance column. Finish to be #4 brushed stainless steel #4, 16 Ga.

3. Transom: Full width reinforced transom. Finish to be #4 brushed stainless steel.

a. 16 Ga.

b. Header: Reinforced header support angle.

4. Cab shell:

a. 14 Ga steel shell

b. Sound deadened exterior cab shell.

5. Cab Interior:

a. Raised Vertical Panels furnished in high impact plastic laminate..

1) Color to be selected by Owner.

a) Provide samples.

2) Add ¼” vertical stainless-steel bar for panelized design.

3) Final design approved by Owner.

4) Required spacing to be provided for installation of finished flooring.

6. Canopy:

a. Minimum No. 12 USSG cold rolled stretcher leveled furniture steel, white enamel.

b. Reinforced to support weight of five workmen minimum as required by code.

c. Canopy to include low profile face to maximize ceiling height.

d. Sound deadened.

e. Top emergency exit, concealed hinges, chain stops, hair line joints.

1) Include MA 3502-cylinder lock with electrical contact.

2) Elevator, upon opening of lock by firefighters or MA licensed elevator technicians, shall function in accordance with A17.1 and MA 524 CMR, Section 35.00.

f. Provide car top safety railing.

1) 4-inch toe board to be incorporated.

7. Lighting and Ceiling:

a. Ceiling: Satin stainless-steel drop ceiling with recessed lighting.

1) #4 stainless steel face

b. Lighting to be LED.

c. Light bulb detail to be provided to owner.

8. Base: Surfaced applied base. 4". Finish to be 16 Ga #4 satin stainless steel.

9. Exhaust Fan: Two speed exhaust fan mounted on isolated rubber grommets with diffuser and grille.

10. Handrail shall be on sides and rear walls:

1) No. 302 stainless steel, finished in #4 satin.

2) Sections to be 2" x 3/8" with 1" diameter stainless steel spacers.

3) Ends turned back to wall.

4) Inconspicuous fastenings.

a) Provide backer plate.

5) Fastenings shall not protrude from brackets or form rough edges.

6) Height of top handrail above finished cab floor to conform to code requirements for the handicapped.

11. Doors:

a. Hollow metal.

b. Flush panel.

c. Minimum thickness one inch.

d. Formed of minimum No. 16 USSG cold rolled stretcher leveled furniture steel.

e. Reinforced full height with formed steel vertical members tying both faces together, maximum 9-inch centers.

f. Reinforced on inside to receive hangers, guides, leading edge reversing device and door operating equipment.

g. Provide door restrictor.

h. Filled with fireproof sound deadening material.

i. Two door guides per door.

1) Nonmetallic.

2) Adjustable.

3) Long wearing.

4) Minimum clearance in sill groove.

5) Quiet in operation.

j. Clad door on car side and leading edge with:

1) Minimum no. 16 USSG No. 18-8 stainless steel, No. 4 satin finish.

2) All fastenings invisible on car side and leading edge.

D. Pad hooks:

1. Provide on side panels:

a. Aluminum

b. Threaded

E. Protection pads:

1. Provide for side panels.

2. Fitted, quilted, fire retardant canvas.

3. Adequately filled to provide proper protection.

4. Arrange stitching to prevent sagging.

5. Heavy duty eyelets properly spaced to suit pad hooks.

F. Certificate holder:

1. Frame shall match cab accessory finish.

2. Integral to car operating panel.

3. Sized for Massachusetts Certificate of Use.

G. Flooring:

1. Substantial support members to be provided to prevent bowing.

2. Sub-floor: Double wood flooring, minimum ¾ inch thick marine grade plywood.

3. Floor covering:

a. Resilient rubber floor.

b. Provide proper underlayment.

c. Installed in accordance with manufacturer's standards.

2.19 Entrances

A. Components

1. Jambs:

a. Minimum No. 14 USSG stainless steel at all floors.

b. Continuously welded to form one-piece frames.

c. UL Fire Rated for 1 ½ hour.

d. Secure frames to sill and header.

2. Sills:

a. Extruded Aluminum.

b. Nonslip surface.

c. Sufficient length to receive two supporting struts.

d. Minimum thickness 13/16 in.

e. Full length nosing approximately 1 in. deep.

f. Machine rabbetted to receive fascia.

g. Grooves: Machine planed with minimum clearance for door guides.

h. Secure to building beams with 3/16 in. formed bracket or equivalent, suitably spaced.

i. Necessary shimming to ensure level sill.

j. Grouted-in solid: By others. Grouting under Related Work Specified Elsewhere.

3. Struts:

a. Formed steel angle.

b. Located and fastened at sill and each end of header.

4. Header:

a. Reinforced header support angle.

b. Minimum 3/16 in. thick formed steel.

c. Designed to receive hangers.

d. Bolted to supporting struts with minimum two bolts at each end.

e. Horizontal bottom flange: Minimum 2 in. wide.

f. Vertical top stiffening flange: Minimum 3 in. high to receive fascia.

5. Cover plates:

a. Minimum No. 14 USSG steel.

b. Length: Full door travel.

c. Removable sections.

d. Above doors for servicing hangers from within car.

6. Fascia:

   a. Minimum No. 14 USSG steel, reinforced where necessary to ensure flat, even surface.

   b. Extend from top of header to sill of door opening above or beam above if there is no door opening. If front hoistway walls are not built in where there are no openings, provide fascia as required by governing Code.

   c. Fastened to header and sill above.

   d. Width: Minimum 12 in. on either side of door opening.

7. Toe guard:

   a. Minimum No. 14 USSG sheet steel.

   b. Install below sill at lowest landing.

   c. Extend vertical portion from bottom landing to top of compressed buffer and then bevel to wall.

   d. Width equal to fascia.

8. Dust plates:

   a. Minimum No. 14 USSG steel.

   b. Above header at top landing.

   c. Bevel top portion back to wall.

9. Doors:

   a. Minimum No. 16 USSG cold rolled, stretcher leveled, furniture steel.

   b. Hollow metal, flush panel type: Minimum 13 in. thick.

   c. Filled with fireproof, sound-deadening material in accordance with Code requirements and UL construction.

   d. Reinforced by formed vertical sections running full height of door, maximum 9 in. on center.

   e. Reinforce for pendant bolts and door operating equipment.

   f. Hoistway door safety retainers in accordance with Code.

   g. Sight guards on each door formed of No. 16 USSG cold rolled furniture steel. Finish to match doors.

   h. Clad on corridor side and leading edge, fastenings shall not be visible from

corridor.

i. Cladding:

1) Minimum No. 16 USSG stainless steel No. 18-8, #4 Brushed Finish at all floors.

B. Hangers and tracks:

1. Hangers:

a. Resilient tread sheaves.

b. Sheave diameter: minimum 2 in.

c. Ball or roller bearings.

d. Sealed to retain lubrication.

e. Mount sheaves on steel or malleable iron hangers.

f. Hangers mounted to door with two cap screws.

g. Hardened steel ball bearings upthrust roller: beneath each sheave with means for fine vertical adjustment.

h. Hanger mounting brackets steel or malleable iron.

2. Tracks:

a. High carbon cold rolled or drawn steel.

b. Shaped and finished to permit free movement of sheaves.

c. Bottom of track: in contact with upthrust roller.

C. Electronic Detector:

1. Electronic type with enclosed antenna located on leading edge of car door including tenite shields for each entrance. Edge shall contain colored lighting: 'GREEN' for open; 'RED' for close.

2. Detection Zone:

a. Full height of door opening.

b. Diminishing with closing of doors when clear of obstruction.

3. When detection zone is interrupted, doors:

a. Shall be prevented from closing from fully open position.

b. Shall stop and reverse from closing.

4. Illuminates ‘Green’ as doors open, flashes ‘Red’ as doors start to close and remains ‘Red’ as doors move together.

5. Doors prevented from closing for 20 seconds will cause buzzer to sound.

a. Nudging shall not be enabled except on direction of Owner.

D. Door Operator:

1. Provide each car door with a high-speed heavy duty, electric door operator and car door clutch, capable of operating a hoistway door and car door simultaneously from the closed to within 3-inches of full open position (or vice versa) at a speed of approximately 1 foot per second.

2. The closing speed shall be slightly slower than the opening speed as herein before specified. The movement of the hoistway and car doors shall be controlled simultaneously by the normal operation of the elevator controls.

3. The doors shall operate smoothly and without slam in both opening and closing directions. Each hoistway and car door shall be cushioned in its final movement in each direction of travel, either by regulated and adjustable electric power or by other equally effective approved devices. Electric power shall be used in the opening and electric or spring power may be used in the closing movement.

4. All levers operating the doors and support members such as headers and tracks shall be constructed of heavy steel members. All pivot points shall have ball or roller bearings of not less than 1-inch outside diameter with bronze brushed bearings of ample size with positive means of lubrication.

5. In case of interruption or failure of the electric power from any cause, the mechanism shall be so designed that it shall permit manual operation of both the hatchway and car doors and the corridor doors shall continue during emergency operation to be self-locking.

6. The door operators shall operate in conjunction with, or incorporate in their design, or be equipped with all interlocks or safety switches.

7. Door operation:

a. Smooth operation without slam or shock.

b. Mechanically or electrically checked in final movement in both directions.

c. Hoistway doors with sill mounted auxiliary closers to automatically close doors if car leaves landing zone.

d. Motion transmitted between doors: linkage, chain or cable gearing.

e. Pivot points: equipped with ball or roller bearings or bronze bushings.

f. Door shall function properly under prevailing building conditions.

E. Car Door Contact and Interlocks:

1. Electrical contact to prevent operation of elevator by normal operating devices, unless car doors are closed.

2. Hoistway entrance with positive electromechanical interlock to prevent normal operation of elevator, unless all hoistway doors are locked in closed position.

3. Interlock to prevent opening hoistway doors from landing side, unless car is within landing zone and is either stopping or stopped.

4. Interlocks: unlockable from elevator car in case of power failure.

5. Provide sill mounted auxiliary door closers.

F. Other Requirements:

1. Provide hoistway door unlocking devices as required by code.

   a. The unlocking device shall be ‘secured at a location in the building that is readily accessible to the fire department.

2. Bottom of doors: two demountable, adjustable, non-metallic guides to fit sill grooves.

3. Provide required gibbs with fire stops.

   a. Turn down fire stops.

4. Provide hoistway door safety retainers, top and bottom, in accordance with code.

   a. The top and bottom of horizontally sliding doors shall be provided with a means of retaining the closed door panel in position if the primary building means fail, and preventing displacement of the door panel top and bottom by more than 0.8 inches when the door panel is subjected to a force of 1,125 lbf in the direction of the hoistway.

   b. The retaining means shall also withstand, without detachment or permanent deformation, a force of 225 lbf applied upward at any point along the width of the door panel.

   c. The retaining means shall not be subjected to wear or stress during normal door operation or maintenance.

5. Install rubber bumpers on side opening doors; recessed astragals on center opening doors.

2.20 Identification

A. Identification of equipment

1. Provide in accordance with ASME A17.1, Section 2.29.

2. In buildings with more than one elevator, provide unique alphabetical or numerical identification, a minimum of 3" in height, adjacent to or on every elevator entrance at the designated level.

B. Identification of floors

1. Provide floor numbers on the hoistway side of the hoistway doors and/or walls at every floor.

C. Data Plates

1. All data plates and tags shall be provided as required by code.

2. Provide data plate confirming to ASME A17.1: 2.16.3.3 on the power door operator or to the car crosshead.

3. Provide data plate with code year directly on elevator disconnect and visible on controller.

PART 3- EXECUTION

3.01 Installation

A. All work performed shall be by MA Elevator licensed personnel. All workmanship and materials shall meet the Commonwealth of Massachusetts Board of Elevator Regulations 524 CMR and ASME A17.1 and all regulatory codes.

B. Painting:

1. Paint:

a. Best grade for purpose; rust inhibitive. Deliver in original sealed containers.

b. Apply in accordance with manufacturer's instructions.

c. Color: as directed by Engineer or Owner.

2. Preparation:

a. Clean, de-grease, de-burr.

3. Structural steel, miscellaneous iron, sheet metal: Prime and finish coat in factory. Touch up in field.

3.02 Adjusting and Cleaning

A. All equipment shall be adjusted, prior to final testing, to obtain peak operation from all equipment.

B. Cleaning:

1. Brush, clean work prior to concealing and painting.

2. Remove debris from inside and outside of materials and equipment.

3. All equipment shall be cleaned prior to final inspection.

4. Provide additional final clean down of hoistways, machine rooms, cabs, pits and all equipment at completion of building construction prior to occupancy.

3.03 Description

A. Tests:

1. Perform as required by Code and as hereinafter noted and in presence of Owner Authorities having jurisdiction.

2. Provide required labor, material, equipment and connections.

3. Document results and submit for approval.

4. Repair or replace defective work, as directed. Pay for restoring or replacing damaged work of others, due to tests, as a result of the Contractor's negligence.

B. Final Inspection:

1. When all work is completed and tested to the satisfaction of the Contractor, the Contractor shall notify the Owner and Architect in writing that the elevator is ready for final inspection and acceptance test. A testing and inspection date shall then be arranged. The proper operation of every part of the elevator system and compliance with contract requirements, including compliance with all applicable requirements of the Code, shall be demonstrated to the Owner and Architect. Furnish all test instruments and materials, required at the time of final inspection.

2. Post Certificate of Use.

C. Final system tests for smoke detection/elevator recall service and emergency power.

1. After work is completed, conduct a pre-test and a final state acceptance test of the entire system. Elevator Contractor responsible for his labor and permit filing fees.

D. Reinspection:

1. If any equipment is found to be damaged or defective or if the performance of the elevator does not conform with the requirements of the contract specifications or the Safety Code, no approval or acceptance of elevators shall be issued until all defects have been corrected. When the repairs and adjustments have been completed and the discrepancies corrected, the Architect shall be notified and the elevator will be reinspected. Rejected elevator shall not be used until it has been reinspected and approved.

E. Training:

1. Provide a MA Licensed Elevator Technician to provide training to building personnel on use of authorized keys; including: light, fan, independent and telephone line monitoring system.

F. Additional Requirements:

1. Prior to expiration of warranty/maintenance service included in contract documents, make a thorough check of all equipment; including but not limited to:

a. Car rails, car sling, roller guides.

b. Car alignment.

c. Door operation, car and landing

d. Complete clean down of rails, car top, door operator and door equipment, pit.

e. Review packings and replace as required.

f. Make adjustments for a car ride acceptable to Owner.

g. Entire elevator system.

2. Testing of all elevator equipment prior to expiration of final one-year Warranty/ Maintenance period.

a. In sufficient time prior to the expiration of the warranty/full preventive maintenance on the elevator, file required permits for each annual and/or five-year weight safety test, firefighters' testing of the elevator equipment.

b. Perform Pre-Inspection Checklist.

c. Include in base bid all costs (permits, labor, load testing) to conduct all testing.

d. Correction of all cited violations, including costs for filing repair permit(s), is to be completed prior to expiration of final one-year warranty / maintenance term.

e. It is the Elevator Contractor's responsibility prior to expiration of Certificate of Use, file for annual test, conduct test and obtain, copy for the Owner and post the new Certificate of Use in the Certificate Frame in the elevator.

3.04 Rubbish Removal

A. The Subcontractor of this Section shall stockpile and drop daily of all wastes and debris at areas designed by the General Contractor.

B. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 74 19 – Construction Waste Management and Disposal.

End of Section 14 24 00

SECTION 14 24 10

HYDRAULIC ELEVATOR
(Filed Sub-Bid Required)

PART 1- GENERAL

1.01 Related Documents:

A. The Contract Documents include the Drawings as enumerated on the Title Drawing, the general provisions of Contract, including General and Supplemental Conditions, and the provisions of this Project Manual and Addenda represent and describe the work and requirements of the Project.

1.02 Filed Sub-Bid Requirement:

A. The Work of this Section is stipulated as a Filed Sub-Bid under Paragraph D, Item 2 of the Form for General Bid.

B. The Sub-Bidder of this Section shall submit Section 00 03 25 – Form for Sub-Bid as required by Section 44F of Chapter 149 of the General Laws, as amended.

C. The Sub-Bidder of this Section is directed to Section 00 01 00 – Instruction to Bidders. All Sub-Bids shall be filed with the Awarding Authority in accordance with requirements stipulated therein.

D. The Sub-Bidder of this Section shall include the Work of the following Section.

1. 14 24 10 Hydraulic Elevator

E. The Sub-Bidder of this Section shall examine Work primarily shown on the following drawing:

1. VT.02: Elevator #1- Plan and Sections

F. The Sub-Bidder of this Section shall examine other specification sections and other drawings that could affect the Work of this Section as it relates to coordination.

1.03 This Section Includes:

A. Section 14 24 10 Hydraulic Elevator.

1. One (1) Holeless Cantilever Hydraulic Elevator.

B. Drawing Sections:

1. VT.02: Elevator 1 - Plans and Section

C. Related Specification Sections:

1. Section 04 Masonry
2. Section 05 Structural Steel
3. Section 08 Doors and Frames
4. Section 09 Painting
5. Section 22 Plumbing
6. Section 23 HVAC
7. Section 26 Electrical

1.04 Description of Work

A. Provide labor, materials, and equipment necessary to complete the work of this section to install One (1) holeless cantilever hydraulic elevator.

B. The Elevator Contractor shall bear the responsibility of coordinating all his work in conjunction with related work specified elsewhere in performing the work specified herein.

C. In general, the contractor shall be responsible for, but not limited to the following:

1. The Work to be performed under this Section 14 24 10.
2. Providing shop drawings and samples.
3. Providing record “As-Built” drawings.
4. Providing a complete elevator installation in accordance with all codes and regulations.
5. Provide in base bid coordination and access for related work requirements.
6. Provide clean down prior to acceptance testing.
    a. Provide complete and final clean down of all elevator equipment, machine room, hoistway and pit at completion of building construction and prior to building occupancy.

D. The requirements on the Drawings shall apply to the work of this Section.

E. Work included:

1. Labor, materials, equipment and services necessary for complete safe installation in accordance with all regulatory codes including, but not limited to, the following specification sections of the contract documents:

a. General Provisions for Hydraulic Elevator Work.

b. Hoistway Equipment for Hydraulic Elevator Work.

c. Machine Room Equipment for Hydraulic Elevator Work.

d. Operating System for Hydraulic Elevator Work.

e. Signal System for Hydraulic Elevator Work.

f. Communication System for Hydraulic Elevator Work.

g. Car Equipment for Hydraulic Elevator Work.

h. Doors and Door Equipment for Hydraulic Elevator Work.

i. Firefighters' Service for Hydraulic Elevator Work.

j. Elevator Emergency Power Connection.

k. Pit Ladder coordination. Provide direction to related trade.

l. Keyed Security Lock Out.

m. Camera wiring provisions (Camera provided by others).

n. Elevator Flooring.

2. Cutting and patching except as noted in Supplementary Conditions for Mechanical and Electrical Work.

3. Provide in Machine Room approved cabinet for all parts, prints, liquids and manuals.

4. Shop drawings and samples.

5. Record "As-Built" drawings:

a. As herein noted.

b. As noted in Division 1, General Requirements.

6. Full Preventive Maintenance and Warranty Coverage:

a. At completion, acceptance and certification of the elevator, it will be covered by Full Preventive Maintenance coverage.

F. Related work specified elsewhere, including but not limited to:

1. Hoistways, pits, machine rooms.

2. Smoke holes, secured gratings.

3. Louvers, screens.

4. Lighting of pit and machine room.

5. Ventilating of hoistway and machine room.

6. Access and guards.

7. Supports for guide rail brackets, buffers, and entrance sills.

8. Installation of pipe sleeves.

9. Installation of inserts.

10. Electric feeders to disconnect switches or circuit breakers and to elevator starter and/or control panels, electric circuits to disconnect switches and to elevator relay panel.

11. Properly grounded disconnect switch in machine room and wiring to the controller.

12. Separate fused lockable 110 Volt disconnect with wiring to controller for car lighting and car fan.

13. Conduit to remote locations for elevator intercommunication and alarm systems, if applicable.

14. Indicated or required chases, openings.

15. Finish painting except as noted.

16. Guarding, protecting hoistway during construction.

17. Storage space for tools, materials.

18. Electric power for testing, adjusting equipment.

19. Metal gratings.

20. Telephone raceway systems.

21. Dedicated Telephone Line and telephone jack to elevator machine room.

22. Grouting under entrance sills and around frames.

23. Photoelectric detectors.

24. Signal from fire alarm system.

25. Signal from emergency generator, as applicable.

26. Provide in the Machine Room 115 VAC, 275 Watt, GFCI receptacle in proximity

to hydraulic reservoir tank unit for hydraulic tank heater (tank heater provided by Elevator Contractor).

27. Provide in Pit area a 115 VAC, 275-Watt, receptacle for Oil Return Scavenger system (Oil return system provided by Elevator Contractor).

28. Floor drain/sump in pit.

1.05 References

A. Labor, material, equipment, services necessary for complete, safe installation in conformity with:

1. American National Standard, Safety Code for Elevators and Escalators (ASME A17.1-2013) as modified by MA 524 CMR and Section 35.00, June 1, 2018 version.

2. Commonwealth of Massachusetts, Board of Elevator Regulations 524 CMR and 521 CMR, AAB, Architectural Access Board.

3. National Building Code (NBC).

4. Uniform Building Code (UBC).

5. American National Standard Specifications for Making Buildings and Facilities Accessible to And Usable by Physically Handicapped People (ANSI A117.1), and Americans For Disabilities Act (ADA).

6. Earthquake provisions as required by Local Code.

7. All National and Local Codes.

8. Authorities having jurisdiction.

1.06 Definitions

A. Specifications are of simplified form and include incomplete sentences. Words or phrases, such as "The Contractor shall," "shall be," "provide," "furnish," "a," "an," "the," and "all" have been omitted for brevity.

B. Additional definitions

1. "Approved," "satisfactory," "accepted," or "directed": as approved, satisfactory, accepted or directed by or to Engineer and/or Owner.

2. "Callback:" In contract service, a customer request which requires a check of an elevator other than the regularly scheduled examination.

3. “Completion, Final”: Full completion, including all punch list items and commencement of one-year warranty/maintenance coverage.

4. “Completion, Substantial”: Completion of all work. Certification by the Department

of Public Safety and return of full use by Owner.

5. "Concealed": embedded in masonry or other construction, installed in furred spaces, within double partitions or hung ceilings, in trenches, in crawl spaces or in enclosures.

6. "Exposed": not installed underground or "concealed" as defined above.

7. "Indicated," "shown," or "noted": as indicated, shown or noted on drawings or specifications.

8. "Install": to erect, mount and connect complete with related accessories.

9. "Provide": to supply, install and connect up complete and ready for safe and regular operation particular work referred to unless specifically indicated otherwise.

10. “Repair:” A scheduled work order as a result of a ‘callback’, or recommendation, etc.

11. "Similar or "equal" of approved Bidder, equal in materials, weight, size, design, and efficiency or specified product, conforming with Base Bid Manufacturer" approved by Engineer and Owner.

12. "Supply": to purchase, procure, acquire and deliver complete with related accessories.

13. "Wiring": Elevator conduit, fittings, wire, junction and outlet boxes, switches, cutouts, receptacles and related items.

14. "Work": labor, materials, equipment, apparatus, controls, accessories, and other items required for proper and complete installation.

1.07 Quality Assurance

A. Elevators: product of individuals, firms or corporations regularly engaged in manufacturing elevators comparable with this contract and in satisfactory operation for period of not less than five years.

B. Operation performance:

1. The control systems shall provide smooth acceleration and deceleration with leveling accuracy at all landings from no load to full rated load in the elevator.

C. Quality and gauges of materials.

1. New, best of their respective kinds, free from defects.

2. Materials, equipment of similar application; same manufacturer, except as noted.

3. Gauges as noted.

4. Secure review of materials, equipment and installation.

1.08 Warranty

A. Warranty:

1. Elevator.

2. Associated equipment.

B. Warranty against:

1. Defective material.

2. Imperfect work.

3. Faulty operation.

C. Warranty period:

1. Continue in effect for one (1) year at the completion, acceptance and certification of the elevator by the Department of Public Safety, Elevator Division.

2. Full preventive maintenance service to continue uninterrupted and coincide with the one-year warranty period.

D. Repair or replace defective work at no additional cost to Owner.

E. Exceptions:

1. Parts damaged by parties other than Contractor through:

a. Misuse.

b. Accident.

c. Negligence.

1.09 Equipment and Service Manuals

A. Equipment Brochure and Service Manuals:

1. Before requesting acceptance of work, furnish as required sets of manufacturer's equipment brochures consisting of:

a. Equipment and components, descriptive literature.

b. Performance data, model number.

c. Vendor and equipment detail.

d. Hydraulic detail.

e. Spare parts lists.

f. Detailed, record and as-built layout.

g. Detailed, simplified, one line, wiring diagrams.

1) Provide complete sets of "as-built" field wiring and straight-line wiring diagrams showing all electric circuits in the hoistway as well as the machine room. One set of diagrams shall be stored in a fire-resistant cabinet in the elevator machine room.

2) Remaining sets, each bound in durable binders. These sets may be incorporated with "Equipment Brochure and Service Manuals".

h. Assemble manufacturer's equipment manuals in chronological order following the specification alpha-numerical system using heavy duty three ring binders.

i. Field test reports.

j. Submit valve tag chart indicating size, type, location, system and number of all valves.

B. Solid State Diagnostic Tools:

1. The elevator control equipment for all elevators will contain diagnostic capabilities required for the ease of complete maintenance of all aspects of the control, dispatch systems and solid-state motor drive units.

2. The diagnostic system shall be an integral part of the controller and provide user-friendly interaction between the serviceman and the controls.

3. All such systems shall be free from secret codes and decaying circuits that must be periodically reprogrammed by the manufacturer.

4. Systems that require hook-up of external devices for troubleshooting are not acceptable.

1.10 Maintenance Schedule

A. Full Preventive Maintenance Service:

1. Provide in Base Bid Full Preventive Maintenance Program for one complete year after the completion of the elevator.

2. To commence upon completion, testing, acceptance, and certification of all elevator Work by the State Elevator Inspector and to continue in full force until one year after state acceptance test date of the elevator.

3. Include:

a. Examination, adjustments, greasing, oiling, parts replacement due to normal

wear and tear use.

4. Cost adjusted to reflect Warranty.

   a. For the purpose of this agreement and subsequent adjustments, the straight time hourly rate for elevator mechanics shall be equal to the actual hourly rate paid to the elevator mechanics plus the fringe benefits granted in lieu of, or in addition to, hourly rate increases. Fringe benefits include, but are not limited to, pensions, vacations, paid holidays, group life insurance, sickness and accident insurance, and hospitalization insurance.

   b. Any change in prices under this provision shall not result in the payment of more than the maximum price permitted by any applicable legally issued government regulations in effect at the time such adjustment is made.

5. Full Service Contract – Following is provided as a guideline and shall include; but not be limited to:

   a. Hydraulic power unit and accessories: pump, motor, valves, operating valves, pulleys, drive belts, flexible hydraulic hose and fitting assemblies, oil tank, muffler, strainer, sound isolating coupling, plunger, packing gland, scavenger systems, piping and other components.

   b. Controller, Selector and Dispatching Equipment: all components including all relays, solid state components, resistors, condensers, transformers, contacts, leads, dashpots, computer devices, selector switches, mechanical or electrical driving equipment, coils, magnet frames, contact switch assemblies, springs, solenoids, resistance grids, hoistway vanes, magnets and inductors.

   c. Hoistway door interlocks or locks and contacts, hoistway door hangers and tracks, bottom door gibs, cams, rollers, and auxiliary door closing devices for power operated doors.

   d. Hoistway limit switches, slowdown switches, leveling switches and associated cams, vanes, and electronic components.

   e. Guide shoes including rollers or replaceable gibs.

   f. Automatic power operated door operators, door protective devices, car door hangers, tracks and car door contacts for both side slide and vertical bi-parting doors.

   g. Traveling cables. Check swing and sway. Repair, replace as required.

      1) Repair, replace, install new protective pads.

   h. Elevator control wiring in hoistway and machine room.

   i. Car safety mechanism and load weighing equipment.

   j. Buffers.

k. Jack Packings.

l. Fixture contacts, pushbuttons, key switches, locks, lamps and sockets of button stations (car and corridor), corridor lanterns, position indicators (car and corridor), direction indicators.

m. Telephone systems. Test and repair or replace.

n. Battery for emergency car lighting.

o. Battery Lowering.

p. The guide rails shall be kept free of rust. Where roller guides are used rails shall be kept dry and properly lubricated when sliding guides are used. Renew guide shoe rollers and gibs as required to ensure smooth and satisfactory operation.

q. Examine, and make necessary adjustments or repair to the following accessory equipment including relamping of signal equipment: corridor lanterns, car and corridor position indicators, car stations, traffic director station, electric door operators, interlocks, door hangers, safety edge, and intercom system.

r. Examine regularly and systematically all safety devices, and conduct an annual no load test, and each fifth year perform a full load, full speed test of safety mechanism, car buffers. The car balance shall be checked. All tests shall be performed in accordance with the provisions of the American National Standard, Safety Code for Elevators and Escalators (ASME A17.1), current edition, as modified by 524 CMR.

1) Conduct Pre-Inspection Checklist.

s. Repair or replace conductor cables and hoistway and machine room elevator wiring.

t. Maintain all elevator equipment in hoistways, machine rooms, and pits in a clean orderly condition, free of dirt, dust and debris.

u. Furnish lubricants compounded specifically for elevator usage.

v. Testing of firefighters' service by keyed switch operation in accordance with A17.1.

6. The Elevator Contractor shall not be required to install new attachments on the elevator whether or not recommended or directed by insurance companies or by governmental authorities, nor to make any replacements with parts of a different design. The Contractor shall not be required to make renewals or repairs necessitated by reason of negligence or misuse of the equipment or by reason of any other cause beyond the contractor's control except ordinary wear and tear unless the Contractor receives just compensation.

7. The Elevator Contractor shall not be responsible for the following items of

elevator equipment: car enclosure (including removable panels, door panels, car gates, plenum chambers, hung ceilings, light diffusers, light tubes and bulbs, handrails, mirrors and carpets): hoistway enclosure: hoistway doors (unless due to maintenance deficiencies), frames and sills.

8. All call-back work is to be performed during regular working hours of regular working days. Emergency call-back calls shall be answered at all hours of the day or night as requested. Should overtime emergency calls (Call backs) be required, these calls shall be billed at Bonus Time Only.

9. Emergency call back response to be within one (1) hour on site.

10. The Contractor shall check the dispatching system and make necessary tests to ensure that all circuits and time settings are properly adjusted, and that the system performs as designed and installed.

    a. Repair or replace conductor cables and hoistway and machine room elevator wiring.

    b. Maintain all elevator equipment in hoistways, machine rooms, and pits in a clean orderly condition, free of dirt, dust and debris.

B. Repair Work and Compensation for Repair Work:

1. Repair Work:

    a. Repair work conducted during regular working hours included in the scope of the contract.

2. The Contractor will begin on site within 24 hours all necessary repairs and replacements due to ordinary wear and tear.

3. Compensation for Repair Work

    1) All Repair Work will be performed where possible during regular working hours of regular working days (8:00 a.m. to 4:30 p.m., Monday through Friday). No additional compensation will be paid for Repair Work performed during these working hours.

    2) When Repair Work must be performed outside of these working hours, prior approval shall be obtained from the Owner. When Repair Work is performed at the request of the Owner outside these working hours, the Contractor's compensation will be increased by only the following amounts:

        a) In the case of materials, no additional amount will be allowed.

        b) In the case of labor, only the premium portion of the Contractor's standard overtime billing rate will be billed.

    3) A separate monthly invoice under this Article will consist solely of

the cost of labor for Repair Work as determined in this article.

4) When Repair Work is performed for the convenience of the Contractor outside of these working hours, the Contractor's compensation will not be increased.

4. Access to Records:

a. The Contractor will provide, when requested, all records and documents in possession of the Contractor, relating to labor expended and material used in the performance of Repair Work, for which the Contractor has been or is to be compensated according to the method described in the paragraph above. Such records and documents will be limited to time tickets and records or replacement parts with the published price lists of the contractor.

5. Repair Work Procedures:

a. Whenever any Repair Work is to be performed by the contractor that will require additional compensation, an estimate of the additional compensation and out-of-service time will be submitted to the Owner, who will give written approval to the contractor. In the case of an emergency, verbal approval from the owner will suffice.

b. Such approval of the Repair Work, in accordance with the terms of this agreement, will entitle the Contractor to compensation in addition to the monthly payments for maintenance if the work is to be performed in other than regular hours.

c. The Contractor will, as a condition of payment for such work, furnish to the Owner at the end of each week daily time slips showing (1) the time and number of each workman employed on such work, (2) the number of hours daily which he is employed thereon, and (3) a brief description of the nature of the work performed. Such weekly time slips are for the purpose of enabling the Owner to determine the accuracy of the amounts to be paid to the Contractor for Overtime Repair Work.

C. Extra Work and Compensation for Extra Work

1. Extra Work Definition:

a. Work above the scope of the contract.

b. The contractor will be on site within 24 hours to conduct all repairs and replacements, and the Owner will pay the contractor, in addition to the monthly price for maintenance, for such proportion of material and labor cost of any repairs and replacements that are necessitated directly by negligence, misuse, accidents, fire, flood, vandalism or abuse which are not the fault of the Contractor.

1) Contractor is to review these Extra Work items directly with the Owner.

2. Replacement of Materials for Extra Work:

    a. Where it is necessary for the Contractor to replace any item of material during the performance of Extra Work under this agreement, the contractor will first submit to the Owner for approval the name of the item or items, the quantity needed, and the material price that the Owner is to be billed. In case of an emergency, verbal approval from the Owner may suffice.

3. Compensation for Extra Work:

    a. The Owner and the Contractor will mutually determine the amount of payment for Extra Work by the Contractor. The amount of payment shall be calculated based on the material and labor used to perform the Extra Work.

    b. The separate monthly invoice under this Article will consist of the cost of repairs or replacement as noted above.

    c. When Extra Work is performed for the convenience of the contractor outside of the regular working hours of regular working days, the Contractor's compensation shall be limited to the straight-time portion of labor cost. The Contractor will be compensated for overtime hours only upon prior approval by the Owner.

4. Extra Work:

    a. The Contractor will provide, when requested, all records and documents in possession of the Contractor directly relating to labor expended and materials used in the Performance of Extra Work (time and material basis) for which the contractor has been or is to be compensated, according to the method described above.

        i. Such records and documents will be limited to time tickets and records of replacement parts with the published priced lists of the Contractor. Certification of other costs will be provided by independent auditors of the contractor's and Owner's choosing at the Owner's request. This audit will be compensated for separately by the Owner.

        ii. If certain materials manufactured by the Contractor do not appear on published priced lists, the Contractor may be requested to display evidence that the charges to the Owner are comparable to those that are being offered to other similar customers of the Contractor.

5. Extra Work Procedures:

    a. Whenever any work is to be performed by the Contractor, an estimate of additional compensation and out-of-service time will be submitted to the Owner, who will give approval to the contractor prior to start of Extra Work.

6. Such approval of the Work, in accordance with the terms of this agreement may

entitle the Contractor to monthly compensation. The Contractor will, as a condition to payment for such work, furnish to the Owner, for the purpose of auditing, at the end of each week, daily time slips showing (1) the number of hours daily which the Contractor has employed thereon, and (2) a brief description of the nature of the work performed, and a list of material used. Such weekly time slips are for the purpose of enabling the Owner to determine the accuracy of the amounts to be paid to the Contractor.

D. Maintenance Responsibility.

1. The Contractor shall keep the elevator maintained to operate at the original contract speed, keeping the original performance time, including acceleration and retardation as designed and installed by the manufacturer. The door operation shall be adjusted as required to maintain the original door opening and door closing times, within legal limits.

2. The Owner reserves the right to make inspections and tests as and when deemed advisable. If it is found that the elevator and associated equipment are deficient either electrically or mechanically, the Contractor will be notified of these deficiencies in writing, and it shall be his responsibility to make the necessary corrections within 30 days after his receipt of such notice. In the event that the deficiencies have not been corrected within 30 days, the Owner may terminate the Contract and employ a Contractor to make the corrections at the original bidder's expense.

3. Approximately three months prior to the end of the contract term, the Owner may make a thorough maintenance inspection of the elevator covered under the contract. At the conclusion of this inspection, the Owner shall give the Contractor written notice of any deficiencies found. The Contractor shall be responsible for correction of these deficiencies within 30 days after receipt of such notice.

4. Access to the equipment for review purposes is the responsibility of the elevator contractor.

5. In sufficient time prior to the end of the one (1) year warranty maintenance period, pay and file annual (or five year) state test permit and test the elevator. Annual testing of elevator is to be conducted in sufficient time to allow for correction of any citations before the completion of the final one (1) year warranty maintenance period.

6. Conduct Pre-Inspection Checklist in accordance with MA 524 CMR.

7. Any citations to be immediately corrected by elevator contractor.

8. All costs for repair permits are the responsibility of the Elevator Contractor.

9. It is the Elevator Contractor's responsibility to ensure that a report documenting the date of the annual safety test as well confirmation of the results of the test be made available to the Owner.

10. It is the Elevator Contractor's responsibility to obtain a copy of the Certificate of

Use for the Owner and to post the Certificate of Use in the elevator.

1.11 Equipment and Materials

A. Guards and Railings:

1. Provide OSHA approved guards for rotating equipment.

2. Furnish guards, railings as indicated and/or as required by Authorities.

3. 4” Minimum Toe Boards as required on car top railing.

B. Nameplates:

1. In addition to manufacturer's standard identification plates provide:

a. Fastened with epoxy cement, screws or rivets, engraved, black sheet with 3/4-inch white lettering.

b. Inscription: subject to review, indicating equipment and voltage.

c. Provide for:

1) Disconnect switches.

2) Control panels.

3) Selector panels.

4) Pumps.

5) Motors.

1.12 Product Delivery, Storage and Handling

A. Moving of equipment:

1. Ship in crated sections of size to permit passing through available space. Contractor will survey existing buildings to observe access to hoistway and machine room.

2. Contractor must obtain approval of time for delivery and routes to bring in equipment and material from Owner.

3. Storage of equipment and materials shall be coordinated with Owner.

1.13 Cleaning

A. Brush and clean work prior to concealing, painting, acceptance.

B. Paint exposed work soiled or damaged: clean, repair to match adjoining work before final acceptance.

C. Remove debris from inside and outside of materials and equipment.

1.14 Painting

A. Painting as follows:

1. Paint:

a. Best grade for purpose; rust inhibitive.

b. Deliver in original sealed containers.

c. Apply in accordance with paint manufacturer's instructions.

d. Color: as directed by architect.

e. Provide MSDS. Update as required.

2. Preparation:

a. Clean, degrease, deburr.

3. Motors, machinery:

a. Finish smooth.

b. Prime coat equipment, fill and finish coat in factory.

c. Machine room equipment, pit equipment and non-plated surfaces (not applicable to polished, milled surfaces, faces of guide rails).

4. Elevator structural steel, miscellaneous iron, sheet metal:

a. Repair scratches and other damage in field. Use same prime finish materials.

1.15 Field Quality Control

A. Tests

1. Perform as hereinafter noted and in presence of:

a. Authorities having jurisdiction.

2. Provide required labor, material, equipment and connections.

3. Document results, submit for review.

4. Repair or replace defective work, as directed.

5. Pay for restoring or replacing damaged work due to tests, as required and as directed.

B. Prior to expiration of one-year warranty/maintenance service included in contract, make a thorough check of:

1. Car rails, car sling, roller guides.
2. Door Operation.
3. Car alignment and operation.
4. Hydraulic systems.
5. Hydraulic packings.
6. Car doors and landing doors.
7. Make adjustments as required for a car ride acceptable to Owner.
8. Entire elevator system.

C. Noise and vibration.

1. Due to faulty equipment or workmanship: correct as required and directed without additional charge.
2. Provide isolation for all panels, pump units, etc. Provide all sound suppression equipment to ensure noise and vibration free operation.

1.16 Schedule

A. Holeless Cantilever Hydraulic Elevator (Refer to VT.02)

1.	Elevator Designation	Passenger
2.	Contract Load in Pounds:	3,500
3.	Contract Speed in FPM:	100
4.	Number of Stops:	1, 2, 3 (Front & Side)
5.	Number of Openings:	Refer to VT.02
6.	Machine location:	Adjacent to Hoistway
7.	Machine type:	Hydraulic Power Unit
8.	Operation:	Simplex, Selective Collective
9.	Motor Horsepower:	Refer to VT.02
10.	Hoistway Size:	Refer to VT.02
11.	Platform (Outside)	Refer to VT.02

12.	Car (Inside):	Refer to VT.02
13.	Car and Hoistway Door Size:	Refer to VT.02
14.	Cab Height:	8'-0"
15.	Car and Hoistway Type:	Front: Two-Speed Side Opening Side: Single Speed Side Opening
16.	Travel:	Refer to VT.02
17.	Door Reversal Device:	'Green'/'Red' Detector Electronic Door Detector
18.	Car Operating Panel:	Main & Auxiliary, Vandal Proof Design
19.	Call registration Indicator (in car):	Required
20.	Car position Indicator (in car):	Required
21.	Corridor Position Indicator at Main Landing:	Required (L.E.D. Lights)
22.	Corridor Call Buttons, Call Registration Lights:	Required (L.E.D. Lights)
23.	Keyed Lock Out:	Car and Hall (TBD)
24.	Car Travel Arrow:	In Car Jamb
25.	Self-leveling:	Required
26.	Telephone	Self-Dialing, Required
27.	Firefighters' Service	Required
28.	Medical Emergency	Required
29.	Emergency Operation	Battery Lowering
30.	Telephone Monitoring	Required

PART 2- PRODUCTS

2.01 Description

A. The Work specified pertains to one (1) Single Post Cantilever Holeless Hydraulic Elevator complete with all car, hoistway, machine room and pit equipment.

2.02 General Hoistway Equipment

A. Complete hoistway, machine room and pit required appurtenances.

2.03 Submittals

A. Shop drawings:

1. Dimensional drawings indicating:

a. Hoistway and equipment.

b. Supports of equipment.

c. Reactions.

d. Weights of equipment.

e. Specification, electrical and BTU data.

f. Machine Room and equipment.

g. Clearances around equipment.

2.04 Seismic Design Protection

A. Elevator to be designed to provide protection during seismic activity.

B. The elevator safety requirements for Seismic Design Category (SDC) ‘B” or as designated and in accordance with ASME A17.1, Part 8.4 and MA 524 CMR, Section 35.00 to include but not be limited to the following:

1. Guarding of Equipment:

a. As required by Code.

b. Snag points

1) Snag points created by rail brackets, rail clip bolts, fishplates, names and similar devices shall be provided with guards to prevent snagging of traveling cable.

2.05 Equipment Material

A. Holeless Cantilever Hydraulic Elevator

1. Single Post Holeless Cantilever Hydraulic jack unit.

2. Jack section will be guided from within the plunger assembly used to house the section.

3. Plunger shall have a high pressure sealing system which will not allow for seal movement or displacement during the course of operation.

4. Jack assembly shall have a check valve built into the assembly to allow for moving the jack to its fully corrected position.

5. The jack shall be designed to be mounted on the pit floor.

6. Jack section shall have a bleeder valve to discharge any air trapped in the assembly.

7. Cylinder:

a. Steel pipe.

b. Thickness to sustain 400 psi test.

c. Built-up construction.

d. External couplings.

e. Fit with cylinder head, incorporating:

1) Adjustable packing gland prevent excessive oil leakage, easily repackable. Provide means to release air from cylinder.

2) Bronze bushing.

3) Strike, for plunger stop collar.

4) Supports.

f. Oil Recovery Unit:

1) Provide in Pit.

2) Collection groove and coupling with runoff tube.

3) Oil collection unit and tubing shall collect oil from cylinders.

8. Plunger:

a. Selected steel tubing.

b. Diameter as approved.

c. Turned true, polished.

d. Built-up construction.

e. Internal couplings.

B. Guide rails and brackets:

1. Planed steel, standard T-section.

2. Extend from pit floor to underside of concrete slab or grating at top of hoistway.

3. Brackets adjustable for width wise and depth wise position.

C. Guides:

1. Mount on top and bottom of car.

2. Roller type:

a. Three ball bearing rubber or composition tire wheels, with adjustable springs or other method subject to review, to maintain rail contract.

b. Suitable for operation on dry unlubricated guide rails.

D. Buffers:

1. Type: Spring

2. Stroke: as required by Code.

3. Pipe struts and braces as required.

4. Locate in pit.

5. Mount on continuous channels secured to guide rails.

E. Automatic terminal stopping devices:

1. To stop car at top and bottom landings.

2. Independent of regular operating device.

3. Provide final limit switches:

a. To stop car that has traveled beyond zone of normal stopping devices.

b. Prevent operation of elevator until reset.

c. Operated by elevator car.

F. Pit Stop Switch and Pit Ladder:

1. Provide stop switch in pit adjacent to point of access to pit.

a. Provide in accordance with code.

2. Pit Ladder

a. Pit ladder provided by others.

b. Elevator Contractor to provide coordination to ensure in accordance with code regulations.

2.06 Installation

A. Cylinder and plunger:

1. Plunger, plumb with elevator at any elevation.

B. Guide rails:

1. Erect plumb and parallel, maximum deviation 1/8 inch.

2. Support to prevent distortion by eccentric loading.

3. Provide rail backing when bracket spacing exceeds 8'-0" or Code recommended maximum.

2.07 Quality Assurance

A. Speed regulation:

1. Rate of change:

a. Constant.

b. Independent of car operating device.

2. Speed: Plus or minus five percent of specified.

2.08 Equipment and Material

A. Power Unit:

1. Including:

a. Oil storage tank: (Submersible)

1) Steel: Welded, reinforced, constructed of 12-gauge.

2) Cover: Removable.

3) Removable oil dip stick and visual oil gauge.

4) Provided with:

a) Protected vent opening.

b) Overflow connections.

c) Capacity: To lift elevator to top landing plus minimum of 10 gallons.

d) Surge control shall prevent oil leaving tank when elevator descends.

e) Oil supply: To raise elevator to top landing plus minimum of 10 gallons.

f) Viscosity as required by pump, environmental conditions.

g) Provide oil heater in tank, to insure constant oil temperature and proper operation of elevator. Elevator shall not be affected by temperature variations.

h) Provide hydraulic oil.

i. Confirm and provide oil in accordance with manufacturer's specifications and requirements for viscosity.

b. Provide Neoprene vibration isolation pads (6"x 4" x 1¼" or as recommended)

c. Oil pump:

1) Positive displacement.

2) Screw or gear type.

a) Accurately cut herringbone or helical gears.

b) Case accurately machined, close fitting to gears.

c) Operate under flooded suction.

3) Induction motor driven.

4) Mount pump and motor on common bedplate with sound, vibration absorbing devices and reinforced isolation mount.

5) Provide with permanent plate stating oil viscosity.

d. Electric motor: AC, polyphase, squirrel cage induction type, designed for

electro-hydraulic requirements.

e. Pump drive:

1) Submersible

a) Pump and motor mounted on reinforced isolation.

b) Designed and manufactured for elevator service.

c) Positive displacement screw type to give smooth operation.

f. Control valves:

1) Main and leveling.

a) Magnetic type.

b) Positive operation.

c) Mounted in discharge line above oil level and easily accessible.

2) Relief.

3) Check.

4) Manually operated lowering valves, gate type.

5) Rupture Valve.

g. Air-bladder silencer provided at the control valve discharge.

h. Hydraulic piping:

1) Steel or wrought iron.

2) Screw type or Victaulic grooved.

3) 400 psi test minimum.

4) Provide with:

a) Blow-out proof muffler and sound isolating coupling.

b) Minimum of two gate valves, one in pit; one in machine room.

c) Oil pressure gauge with gate valve in line.

d) Sleeves, when passing through walls: Minimum one-inch clearance between piping and sleeve filled with fiberglass

packing, both ends sealed with fireproof, non-hardening mastic, 1/4-inch minimum thickness. Sleeves supplied by Elevator Contractor, installation under Related Work Specified Elsewhere.

B. Controller:

1. Controller to be solid state microprocessor design.

2. Controller requiring plug-in diagnostic tooling or devices is not acceptable.

3. Panel:

a. Insulated, secure to steel frame.

b. Enclose in steel cabinet, with swing front doors.

c. Provide with:

1) Pump motor starter, electronic Soft Start.

2) Electromagnetic control switches and auxiliaries.

3) Automatic self-leveling.

a) Two way leveling and releveling within 1/4 inch.

b) Releveling: with car and landing doors open or closed.

4) Overload relays with manual reset.

5) Sequence starting relays for multiple motor installations.

6) Two mainline switches.

7) Circuitry for Failure Protection, as specified.

8) Contacts to receive signal from Photoelectric (or other fire) detection system.

a) Identify each device on panel.

C. Selector:

1. Selector floor switches in elevator hoistway.

2. To govern:

a. Direction of travel.

b. Stopping.

c. Leveling.

d. Signal lantern lighting.

D. Wiring:

1. From control panels and relay panels to equipment and from hoistway junction box to elevator. Provide transformer for required relay panel control voltage.

2. Install in metal wireways and raceways with outlet boxes as specified under Electrical Work, except for trial cables and short connections.

3. Traveling cables: Underwriters labeled, fire and moisture resistant outer braid and steel supporting strand. Provide minimum 10 percent spares, not less than six wires.

4. Branch circuit and control wiring: TEW or THW insulation, 600 volts.

5. Telephone wiring: Shall meet telephone company requirements. In trail cable from hoistway junction box to car. From hoistway junction box to terminal box in machine integrity or wiring.

6. From shaft riser to door interlocks, SF-2 type or equivalent; maximum operating temperature, 392 degrees F. Terminations shall be insulated to maintain integrity of wiring.

7. Install short connections (non-moist locations) in flexible conduit.

8. Conduit: Galvanized steel.

9. Install green ground wire as required.

10. Traveling Cable

    a. New traveling cables designed for elevator service in accordance with NFPA Standards.

    b. The cables shall be sufficiently flexible to readily adapt to all changes in the position of the elevator car and hang straight without twist. The cables shall be capable of bending 360 degrees with an inside radius of one foot without any permanent set and without cracking of the outer covering. The open loop shall show no tendency to twist upon itself.

    c. Traveling cables shall have non-metallic fillers and shall be suspended by Crosby clips or looping cable around supports.

    d. In addition, Kellum grips shall be provided to reduce slipping of jacketing and conductors.

11. The traveling cables shall include telephone cabling and shall be properly supported. The terminal boxes shall have approved connection strips for connecting conductors and, in addition to said devices for connecting conductors,

approved strain devices for connecting the supporting strands and relieving the conductors of the traveling cables of all strain.

12. The swing of the traveling cables shall be checked when the elevator is running and all shields and pads necessary to prevent chafing shall be installed. The loop in the traveling cables shall be not less than 2 feet unless otherwise approved.

13. The traveling cables and the corresponding groups of conductors connecting these cables to the control, signal, and car operating panels shall each contain at least 10 percent spare conductors, but not less than two spare conductors of the same size and type.

14. Each traveling cable conductor shall have a distinctive color-coded outer covering for identification. Terminal blocks shall have indelible identification numbers for each terminal connection.

15. Provide shielded wires for communication.

16. Additional Wiring Requirements:

    a. Provide RG6U Coaxile Twisted Cable or as designated for provisions for future camera installation.

2.09 Installation

A. Install equipment making full use of space available for maximum access to all equipment.

1. All equipment to be installed in conformance with code regulated clearances.

2.10 Field Quality Control

A. Tests

1. Acceptance test in accordance with A17.1 and MA 524 CMR.

B. Protection of equipment:

1. Fully protect equipment from time of delivery until machine room is weather-tight.

2. Power unit and controller shall be enclosed in plastic-type bag or approved equal prior to equipment installation.

2.11 Description

A. Complete operating systems, equipment and appurtenances:

1. Operating systems:

    a. Simplex selective collective operation.

    b. Independent service operation.

c. Top of car operation.

d. Operation of Elevator Under Fire or Other Emergency Conditions per Massachusetts Elevator Code.

e. Emergency car lighting and alarm bell system.

f. Failure protection operation.

g. Earthquake provisions in conformance with code.

2. Provide operation and equipment as required to meet all applicable accessibility Codes.

2.12 Submittals

A. Shop drawings:

1. Submit detailed dimensional drawings detailing:

2. Hoistway and equipment.

3. Supports of equipment.

4. Reactions.

5. Weights of equipment.

6. Electrical and BTU data.

7. Shop Drawings: Machine Room

8. Dimensional layout indicating:

9. Machine room and equipment.

10. Electrical Data.

11. Clearances around equipment.

12. Weights and supports for the equipment.

13. Reactions.

14. BTU and horsepower data.

15. Submit detailed drawings of all signal fixtures and cuts of all acceptable standard fixtures.

a. Submit Electronic PDF.

16. Drawings, cuts: Completely dimensioned; indicated faceplate finishes, operating

devices.

a. Include type of construction in which fixtures will be installed including method of installation.

17. Submittals to have sufficient margin area for approval stamping.

2.13 Operating Systems

A. Simplex Selective Collective Operation:

1. Pressure of car or corridor button, other than landing at which car is standing, shall start car and cause car to stop at first landing for which call was registered, corresponding to direction of car travel.

2. Car shall stop at all landings where calls are registered, relating to travel direction.

3. Calls registered for opposite direction of car travel shall remain registered and be answered after car has completed its calls in direction of travel.

4. If no car buttons are pressed and car starts UP in response to several DOWN calls, car shall answer highest DOWN call first and then reverse to collect other DOWN calls.

5. Time limit relay shall hold car a few seconds at landing to enable passengers to enter and leave car. When car has answered farthest call this interval shall permit car button call to be registered to establish direction of travel, even though corridor call is registered far opposite direction of travel.

6. Doors open automatically when car stops at landing.

7. Doors close predetermined interval after opening unless closing is interrupted by car door reversal device or door open button in car.

8. Pressing of corridor button at floor where car is standing shall open doors.

9. Emergency stop switch: When activated shall cause car to stop.

10. Key operated inspection switch: takes car out of normal operation and permits slow speed operation for inspection.

11. Key operated independent service switch: takes car out of normal operation and gives attendant full control over starting, stopping and direction of travel from car buttons only. Car shall travel at contract speed and shall not respond to corridor calls.

12. Six (6) sets of keys to be provided to Owner at completion of work and certification of elevator.

a. Light, Fan, Independent, Telephone Monitoring Alarm and any owner designated key.

B. Failure protection:

1. Operational failure protection:

a. Control circuit designed to detect malfunction due to:

1) Motor starter failure.

2) Low oil in system.

3) Car failure to reach a landing in up direction within a pre-determined time.

b. Causes elevator to automatically descend to bottom landing.

C. Emergency Battery Lowering:

1. Emergency Battery Lowering to be provided on elevator.

2. Upon loss of power, Battery Rescue shall engage lower the elevator to the bottom landing.

3. Elevator door shall open and then close and car shall remain at the landing with the doors closed.

4. Upon return of normal power, battery shall recharge and elevator shall be operational.

5. All systems and functions in accordance with code.

D. Top-of-Car Operation:

1. Operating device:

a. UP/DOWN buttons, constant pressure type; EMERGENCY STOP button, momentary pressure type, in accordance with Code.

b. When operated: Car to travel at reduced speed.

E. Operation of elevators under fire or other emergency conditions:

1. Phase I Emergency Recall Operation:

a. Provide operation and equipment as required by governing Code (ASME A17.1- current code, Modified by 524 CMR).

1) Elevator Contractor shall provide required relays, wiring, and terminal strips to receive signal from photoelectric detector, sprinkler or fire alarm systems.

2) Photoelectric detector, sprinkler or fire alarm system devices, wiring, etc., and connection to terminal strips in elevator controller

panel(s) are under Work Specified Elsewhere.

b. Coordinate with fire alarm systems contractor.

2. Phase II Emergency In-Car Operation:

a. Provide operation and equipment as required by governing code.

b. All features, functions and operation to be in accordance with A17.1-current code, along with all modifications as stated in MA 524 CMR and all regulatory codes and authorities.

F. Medical Emergency Operation

1. Provide in accordance with code.

2.14 Equipment and Material

A. Car Operation:

1. Car operating panel (main and auxiliary):

a. Stations to be identical in size.

b. All buttons: stainless steel vandal proof positive stop design; high visibility L.E.D. light.

c. EMERGENCY STOP switch (keyed).

d. ALARM button.

e. Light switch.

f. Emergency light test switch.

g. Fan switch: two speed.

h. DOOR OPEN button.

i. Key operated inspection switch.

j. Key operated independent service switch.

k. Keyed lock out. (To be Determined)

l. Emergency push button telephone programmed with audio message detailing location of elevator.

m. Fire emergency visual and audible signals and Firefighters' Operation Panel.

n. Medical Emergency Jewel and Key Switch.

o. All keying required per Massachusetts Elevator Code.

p. Digital position indicator.

q. Certificate Frame sized to accommodate MA Certificate of Use.

1) Located on Car Operating Panel.

r. All signage to be engraved including but not limited to:

1) No smoking

2) Capacity

3) Firefighters' Operation

2. UP and DOWN call registered buttons at all intermediate landings and single button at terminal landings.

3. All lights for buttons and signals to be high visibility LED.

4. No plastic lenses.

5. Keyed access switches as designated.

6. Provide equipment and operation to meet all applicable accessibility codes.

2.15 Description

A. Complete systems of signal equipment and appurtenances. All lights for signals and buttons to be high visibility LED. Buttons to be stainless steel:

1. Car position indicator.

2. Alarm bell.

3. Direction arrow in car jamb.

4. Hoistway access switches.

5. Corridor call pushbuttons. Stainless Steel button with LED illumination.

6. Faceplates to be finished in No.4 Satin Stainless steel.

7. All required signs to be engraved on signal fixture faceplate. Applied signs will not be acceptable.

8. All signage in accordance with MA 524 CMR.

9. No plastic lenses or buttons.

B. Provide equipment and operation as required to meet all applicable accessibility Codes.

2.16 Signal Fixtures

A. Car/Hall Position and Direction Indicator:

1. Digital type mounted in car station and main landing.

2. Include UP and DOWN digital indicators. No plastic indicators.

3. All lights to be high visibility LED.

4. Hall push buttons, upon activation, call registration to be clearly seen and registration of call readily identifiable.

B. Alarm bell:

1. Under Car Platform:

a. Provide bell.

b. Diameter: 6 in.

c. Connect to Alarm pushbutton.

d. Include wiring and transformers.

C. Hoistway Access Switches:

1. Top landing.

2. Bottom landing.

3. Operation and equipment as required by Code.

D. Corridor Call Pushbuttons:

1. Call register type, vandal proof positive stop design.

2. Stainless Steel button with LED illumination required.

3. Lights to be high visibility LED.

4. The centerline of the hall call pushbutton(s) shall be exactly 42 inches from the centerline of the single button (terminal floor).

E. Keyed Security Key Switch (To be Determined):

1. At each landing and in car operating panel provide an ‘off’ – ‘on’ key switch for security access to the elevator.

2. Key switch to be provided in each hall fixture and in car operating panel.

3. Key removeable in either position.

F. Firefighters' Recall Operation

1. Provide Firefighters' Recall Operation at designated landing in hall station.

2. Key Switch and Visual Fire Hat visual indicator.

3. Provide signage in accordance with MA Code and A17.1. All signage to be engraved.

4. All keying to be in conformance with MA 524 CMR.

G. Provide car direction arrows in the car jamb.

1. No plastic lenses.

2. Vandal proof.

3. Lighting to be LED.

4. Located in each car jamb.

5. Signals to be in accordance with ADA code.

H. Provisions for the handicapped

1. Provide for handicapped accessibility as required but not limited to the following:

2. Arabic Numerals and Braille Symbols: Provide raised Arabic Numerals 3/4 inch in height and Braille symbols corresponding to the numerals on the elevator buttons located immediately left thereof. The Braille symbols shall be placed to the left of the corresponding raised Arabic numerals, or where space does not permit, the Braille symbols shall be placed directly below the Arabic numerals. Other controls and emergency equipment shall be identified by raised symbols, including door open, door close, emergency alarm, emergency bell, emergency stop, and telephone.

a. Locations of Numerals and Symbols: Passenger elevator door frames on all elevator floors shall have the number of the floor on which the frame is located designated Arabic numeral 2-1/2 inches in height of approximately 60 inches above the floor located on both sides of jamb so that it is visible from within the elevator. Braille symbols shall be placed directly to the left of corresponding raised Arabic numerals.

I. Medical Emergency

1. Provide Medical Emergency Key Switch and Jewel in main landing hall push button and car operating panel.

2. All functions and features to operate in accordance with code.

2.17 Communications

A. Communication system, complete with all equipment and appurtenances:

1. Provide as integral part of car station a hands free, push button telephone system.

a. Pre-recorded phone message to contain elevator location/designation.

b. Dedicated telephone line and telephone jack to be provided by others.

c. Telephone to be programmed to telephone number as provided and directed by Owner.

B. Phone Line Monitoring System

1. In accordance with A17.1: 2.27.1.1.6, provide means to verify operability of the telephone line.

a. Verification of telephone line operability shall be automatically performed.

b. A minimum of one visual and one audible signal shall be provided for each group of elevators controlled by a “Fire Recall” switch.

c. The visual signal shall be located in the hall push button station in the vicinity of the “Fire Recall” switch.

1) Signal Labeled “ELEVATOR COMMUNICATIONS FAILURE”

i. Illuminate intermittentness upon phone line failure.

ii. Continues to illuminate intermittently until phone line is functional.

d. Audible signal shall sound every 30 seconds.

1) Signal shall continue until silenced by authorized personnel or the telephone line is functional.

e. Periodic Verification shall be at least once on a daily basis.

2.18 Car Equipment

A. Elevator car frame, platform, toe guard:

1. Car frame and auxiliary supports.

a. Structural steel members.

b. Welded, riveted or bolted to form rigid unit.

2. Platform:

   a. Designed for Class of loading specified.

   b. Steel frame with steel subfloor or structural steel frame filled with:

      1) Double wood flooring, each floor minimum 3/4 in. thick marine grade plywood.

   c. Underside: Fire-proofed with minimum No. 27 USSG sheet steel.

   d. Mount on neoprene pads.

   e. Support pads with auxiliary steel, frame, fastened to car frame forming isolated cushion between car and frame.

3. Toe guard:

   a. Minimum No. 16 USSG cold rolled sheet steel on entrance side.

   b. Full width of entrance.

   c. As required by Code.

4. Sill:

   a. Extruded aluminum with approved non- slip surface.

   b. Length to accommodate door in fully open position.

   c. Minimum thickness 7/16 in.

   d. Grooves machine planed, minimum guide clearance.

   e. Machine rabbetted to receive toe guard.

   f. Securely fastened to platform.

   g. Shimmed to be level.

   h. Parallel to centerline elevator guide rails.

B. Worklights and Receptacles:

1. On top of car and under platform:

   a. Lamp socket

   b. Duplex grounded receptacles.

   c. Lamp wire guard.

C. Cab Enclosure:

1. Return Panel: Stationary reinforced front return panel set up to accommodate new car main operating panel. Finish to be #4 brushed stainless steel, 16 Ga.

2. Strike Jamb: Reinforced strike jamb and entrance column. Finish to be #4 brushed stainless steel #4, 16 Ga.

3. Transom: Full width reinforced transom. Finish to be #4 brushed stainless steel.

   a. 16 Ga.

   b. Header: Reinforced header support angle.

4. Cab shell:

   a. 14 Ga steel shell

   b. Sound deadened exterior cab shell.

5. Cab Interior:

   a. Raised Vertical Panels furnished in high impact plastic laminate.

      1) Color to be selected by Owner.

         a) Provide samples.

      2) Add ¼" vertical stainless-steel bar for panelized design.

      3) Final design approved by Owner.

      4) Required spacing to be provided for installation of finished flooring.

6. Canopy:

   a. Minimum No. 12 USSG cold rolled stretcher leveled furniture steel, white enamel.

   b. Reinforced to support weight of five workmen minimum as required by code.

   c. Canopy to include low profile face to maximize ceiling height.

   d. Sound deadened.

   e. Top emergency exit, concealed hinges, chain stops, hair line joints.

      1) Include MA 3502-cylinder lock with electrical contact.

      2) Elevator, upon opening of lock by firefighters or MA licensed

elevator technicians, shall function in accordance with A17.1 and MA 524 CMR, Section 35.00.

f. Provide car top safety railing.

1) 4-inch toe board to be incorporated.

7. Lighting and Ceiling:

a. Ceiling: Satin stainless-steel drop ceiling with recessed lighting.

1) #4 stainless steel face

b. Lighting to be LED.

c. Light bulb detail to be provided to owner.

8. Base: Surfaced applied base. 4". Finish to be 16 Ga #4 satin stainless steel.

9. Exhaust Fan: Two speed exhaust fan mounted on isolated rubber grommets with diffuser and grille.

10. Handrail shall be on side and rear walls:

1) No. 302 stainless steel, finished in #4 satin.

2) Sections to be 2" x 3/8" with 1" diameter stainless steel spacers.

3) Ends turned back to wall.

4) Inconspicuous fastenings.

a) Provide backer plate.

5) Fastenings shall not protrude from brackets or form rough edges.

6) Height of top handrail above finished cab floor to conform to code requirements for the handicapped.

11. Doors:

a. Hollow metal.

b. Flush panel.

c. Minimum thickness one inch.

d. Formed of minimum No. 16 USSG cold rolled stretcher leveled furniture steel.

e. Reinforced full height with formed steel vertical members tying both faces

together, maximum 9-inch centers.

f. Reinforced on inside to receive hangers, guides, leading edge reversing device and door operating equipment.

g. Provide door restrictor.

h. Filled with fireproof sound deadening material.

i. Two door guides per door.

1) Nonmetallic.

2) Adjustable.

3) Long wearing.

4) Minimum clearance in sill groove.

5) Quiet in operation.

j. Clad door on car side and leading edge with:

1) Minimum no. 16 USSG No. 18-8 stainless steel, No. 4 satin finish.

2) All fastenings invisible on car side and leading edge.

D. Pad hooks:

1. Provide on side and rear panels:

a. Aluminum

b. Threaded

E. Protection pads:

1. Provide for side and rear panels.

2. Fitted, quilted, fire retardant canvas.

3. Adequately filled to provide proper protection.

4. Arrange stitching to prevent sagging.

5. Heavy duty eyelets properly spaced to suit pad hooks.

F. Certificate holder:

1. Frame shall match cab accessory finish.

2. Integral to car operating panel.

3. Sized for Massachusetts Certificate of Use.

G. Flooring:

1. Substantial support members to be provided to prevent bowing.

2. Sub-floor: Double wood flooring, minimum ¾ inch thick marine grade plywood.

3. Floor covering:

a. Resilient rubber floor.

b. Provide proper underlayment.

c. Installed in accordance with manufacturer's standards.

2.19 Entrances

A. Components

1. Jambs:

a. Minimum No. 14 USSG stainless steel at all floors.

b. Continuously welded to form one-piece frames.

c. UL Fire Rated for 1 ½ hour.

d. Secure frames to sill and header.

2. Sills:

a. Extruded Aluminum.

b. Nonslip surface.

c. Sufficient length to receive two supporting struts.

d. Minimum thickness 13/16 in.

e. Full length nosing approximately 1 in. deep.

f. Machine rabbetted to receive fascia.

g. Grooves: Machine planed with minimum clearance for door guides.

h. Secure to building beams with 3/16 in. formed bracket or equivalent, suitably spaced.

i. Necessary shimming to ensure level sill.

j. Grouted-in solid: By others. Grouting under Related Work Specified

Elsewhere.

3. Struts:
   a. Formed steel angle.
   b. Located and fastened at sill and each end of header.
4. Header:
   a. Reinforced header support angle.
   b. Minimum 3/16 in. thick formed steel.
   c. Designed to receive hangers.
   d. Bolted to supporting struts with minimum two bolts at each end.
   e. Horizontal bottom flange: Minimum 2 in. wide.
   f. Vertical top stiffening flange: Minimum 3 in. high to receive fascia.
5. Cover plates:
   a. Minimum No. 14 USSG steel.
   b. Length: Full door travel.
   c. Removable sections.
   d. Above doors for servicing hangers from within car.
6. Fascia:
   a. Minimum No. 14 USSG steel, reinforced where necessary to ensure flat, even surface.
   b. Extend from top of header to sill of door opening above or beam above if there is no door opening. If front hoistway walls are not built in where there are no openings, provide fascia as required by governing Code.
   c. Fastened to header and sill above.
   d. Width: Minimum 12 in. on either side of door opening.
7. Toe guard:
   a. Minimum No. 14 USSG sheet steel.
   b. Install below sill at lowest landing.
   c. Extend vertical portion from bottom landing to top of compressed buffer

and then bevel to wall.

d. Width equal to fascia.

8. Dust plates:

a. Minimum No. 14 USSG steel.

b. Above header at top landing.

c. Bevel top portion back to wall.

9. Doors:

a. Minimum No. 16 USSG cold rolled, stretcher leveled, furniture steel.

b. Hollow metal, flush panel type: Minimum 13 in. thick.

c. Filled with fireproof, sound-deadening material in accordance with Code requirements and UL construction.

d. Reinforced by formed vertical sections running full height of door, maximum 9 in. on center.

e. Reinforce for pendant bolts and door operating equipment.

f. Hoistway door safety retainers in accordance with Code.

g. Sight guards on each door formed of No. 16 USSG cold rolled furniture steel. Finish to match doors.

h. Clad on corridor side and leading edge, fastenings shall not be visible from corridor.

i. Cladding:

1) Minimum No. 16 USSG stainless steel No. 18-8, #4 Brushed Finish at all floors.

B. Hangers and tracks:

1. Hangers:

a. Resilient tread sheaves.

b. Sheave diameter: minimum 2 in.

c. Ball or roller bearings.

d. Sealed to retain lubrication.

e. Mount sheaves on steel or malleable iron hangers.

f. Hangers mounted to door with two cap screws.

g. Hardened steel ball bearings upthrust roller: beneath each sheave with means for fine vertical adjustment.

h. Hanger mounting brackets steel or malleable iron.

2. Tracks:

a. High carbon cold rolled or drawn steel.

b. Shaped and finished to permit free movement of sheaves.

c. Bottom of track: in contact with upthrust roller.

C. Electronic Detector:

1. Electronic type with enclosed antenna located on leading edge of car door including tenite shields for each entrance. Edge shall contain colored lighting: 'GREEN' for open; 'RED' for close.

2. Detection Zone:

a. Full height of door opening.

b. Diminishing with closing of doors when clear of obstruction.

3. When detection zone is interrupted, doors:

a. Shall be prevented from closing from fully open position.

b. Shall stop and reverse from closing.

4. Illuminates 'Green' as doors open, flashes 'Red' as doors start to close and remains 'Red' as doors move together.

5. Doors prevented from closing for 20 seconds will cause buzzer to sound.

a. Nudging shall not be enabled except on direction of Owner.

D. Door Operator:

1. Provide each car door with a high-speed heavy duty, electric door operator and car door clutch, capable of operating a hoistway door and car door simultaneously from the closed to within 3-inches of full open position (or vice versa) at a speed of approximately 1 foot per second.

2. The closing speed shall be slightly slower than the opening speed as herein before specified. The movement of the hoistway and car doors shall be controlled simultaneously by the normal operation of the elevator controls.

3. The doors shall operate smoothly and without slam in both opening and closing

directions. Each hoistway and car door shall be cushioned in its final movement in each direction of travel, either by regulated and adjustable electric power or by other equally effective approved devices. Electric power shall be used in the opening and electric or spring power may be used in the closing movement.

4. All levers operating the doors and support members such as headers and tracks shall be constructed of heavy steel members. All pivot points shall have ball or roller bearings of not less than 1-inch outside diameter with bronze brushed bearings of ample size with positive means of lubrication.

5. In case of interruption or failure of the electric power from any cause, the mechanism shall be so designed that it shall permit manual operation of both the hatchway and car doors and the corridor doors shall continue during emergency operation to be self-locking.

6. The door operators shall operate in conjunction with, or incorporate in their design, or be equipped with all interlocks or safety switches.

7. Door operation:

   a. Smooth operation without slam or shock.

   b. Mechanically or electrically checked in final movement in both directions.

   c. Hoistway doors with sill mounted auxiliary closers to automatically close doors if car leaves landing zone.

   d. Motion transmitted between doors: linkage, chain or cable gearing.

   e. Pivot points: equipped with ball or roller bearings or bronze bushings.

   f. Door shall function properly under prevailing building conditions.

E. Car Door Contact and Interlocks:

1. Electrical contact to prevent operation of elevator by normal operating devices, unless car doors are closed.

2. Hoistway entrance with positive electromechanical interlock to prevent normal operation of elevator, unless all hoistway doors are locked in closed position.

3. Interlock to prevent opening hoistway doors from landing side, unless car is within landing zone and is either stopping or stopped.

4. Interlocks: unlockable from elevator car in case of power failure.

5. Provide sill mounted auxiliary door closers.

F. Other Requirements:

1. Provide hoistway door unlocking devices as required by code.

a. The unlocking device shall be ‘secured at a location in the building that is readily accessible to the fire department.

2. Bottom of doors: two demountable, adjustable, non-metallic guides to fit sill grooves.

3. Provide required gibbs with fire stops.

a. Turn down fire stops.

4. Provide hoistway door safety retainers, top and bottom, in accordance with code.

a. The top and bottom of horizontally sliding doors shall be provided with a means of retaining the closed door panel in position if the primary building means fail, and preventing displacement of the door panel top and bottom by more than 0.8 inches when the door panel is subjected to a force of 1,125 lbf in the direction of the hoistway.

b. The retaining means shall also withstand, without detachment or permanent deformation, a force of 225 lbf applied upward at any point along the width of the door panel.

c. The retaining means shall not be subjected to wear or stress during normal door operation or maintenance.

5. Install rubber bumpers on side opening doors; recessed astragals on center opening doors.

2.20 Identification

A. Identification of equipment

1. Provide in accordance with ASME A17.1, Section 2.29.

2. In buildings with more than one elevator, provide unique alphabetical or numerical identification, a minimum of 3” in height, adjacent to or on every elevator entrance at the designated level.

B. Identification of floors

1. Provide floor numbers on the hoistway side of the hoistway doors and/or walls at every floor.

C. Data Plates

1. All data plates and tags shall be provided as required by code.

2. Provide data plate confirming to ASME A17.1: 2.16.3.3 on the power door operator or to the car crosshead.

3. Provide data plate with code year directly on elevator disconnect and visible on controller.

PART 3- EXECUTION

3.01 Installation

A. All work performed shall be by MA Elevator licensed personnel. All workmanship and materials shall meet the Commonwealth of Massachusetts Board of Elevator Regulations 524 CMR and ASME A17.1 and all regulatory codes.

B. Painting:

1. Paint:

a. Best grade for purpose; rust inhibitive. Deliver in original sealed containers.

b. Apply in accordance with manufacturer's instructions.

c. Color: as directed by Engineer or Owner.

2. Preparation:

a. Clean, de-grease, de-burr.

3. Structural steel, miscellaneous iron, sheet metal: Prime and finish coat in factory. Touch up in field.

3.02 Adjusting and Cleaning

A. All equipment shall be adjusted, prior to final testing, to obtain peak operation from all equipment.

B. Cleaning:

1. Brush, clean work prior to concealing and painting.

2. Remove debris from inside and outside of materials and equipment.

3. All equipment shall be cleaned prior to final inspection.

4. Provide additional final clean down of hoistways, machine rooms, cabs, pits and all equipment at completion of building construction prior to occupancy.

3.03 Description

A. Tests:

1. Perform as required by Code and as hereinafter noted and in presence of Owner Authorities having jurisdiction.

2. Provide required labor, material, equipment and connections.

3. Document results and submit for approval.

4. Repair or replace defective work, as directed. Pay for restoring or replacing damaged work of others, due to tests, as a result of the Contractor's negligence.

B. Final Inspection:

1. When all work is completed and tested to the satisfaction of the Contractor, the Contractor shall notify the Owner and Architect in writing that the elevator is ready for final inspection and acceptance test. A testing and inspection date shall then be arranged. The proper operation of every part of the elevator system and compliance with contract requirements, including compliance with all applicable requirements of the Code, shall be demonstrated to the Owner and Architect. Furnish all test instruments and materials, required at the time of final inspection.

2. Post Certificate of Use.

C. Final system tests for smoke detection/elevator recall service and emergency power.

1. After work is completed, conduct a pre-test and a final state acceptance test of the entire system. Elevator Contractor responsible for his labor and permit filing fees.

D. Reinspection:

1. If any equipment is found to be damaged or defective or if the performance of the elevator does not conform with the requirements of the contract specifications or the Safety Code, no approval or acceptance of elevators shall be issued until all defects have been corrected. When the repairs and adjustments have been completed and the discrepancies corrected, the Architect shall be notified and the elevator will be reinspected. Rejected elevator shall not be used until it has been reinspected and approved.

E. Training:

1. Provide a MA Licensed Elevator Technician to provide training to building personnel on use of authorized keys; including: light, fan, independent and telephone line monitoring system.

F. Additional Requirements:

1. Prior to expiration of warranty/maintenance service included in contract documents, make a thorough check of all equipment; including but not limited to:

a. Car rails, car sling, roller guides.

b. Car alignment.

c. Door operation, car and landing

d. Complete clean down of rails, car top, door operator and door equipment, pit.

e. Review packings and replace as required.

f. Make adjustments for a car ride acceptable to Owner.

g. Entire elevator system.

2. Testing of all elevator equipment prior to expiration of final one-year Warranty/ Maintenance period.

a. In sufficient time prior to the expiration of the warranty/full preventive maintenance on the elevator, file required permits for each annual and/or five-year weight safety test, firefighters' testing of the elevator equipment.

b. Perform Pre-Inspection Checklist.

c. Include in base bid all costs (permits, labor, load testing) to conduct all testing.

d. Correction of all cited violations, including costs for filing repair permit(s), is to be completed prior to expiration of final one-year warranty / maintenance term.

e. It is the Elevator Contractor's responsibility prior to expiration of Certificate of Use, file for annual test, conduct test and obtain, copy for the Owner and post the new Certificate of Use in the Certificate Frame in the elevator.

3.04 Rubbish Removal

A. The Subcontractor of this Section shall stockpile and drop daily of all wastes and debris at areas designed by the General Contractor.

B. The General Contractor shall remove and dispose daily of all waste and debris in accordance with the requirements of Section 01 74 19 – Construction Waste Management and Disposal.

End of Section 14 24 10

SECTION 21.00.00

FIRE PROTECTION
(Filed Sub-Bid Required)

PART I - GENERAL

1.01 GENERAL REQUIREMENTS

A. Attention is directed to the general and supplementary conditions and Division 1 including all sub-divisions thereof as listed in the table of contents, which are hereby made a part of this Section.

B. All work shall comply with all federal, state and local codes and any other authorities having jurisdiction including any special requirements of the Owner and/or Architect.

1.02 TIME, MANNER AND REQUIREMENTS FOR SUBMITTING SUB-BIDS

A. Sub-bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the Enter Name and Address for Place of Bid Openging at time and place stipulated in the "Invitation to Bid/Notice to Contractors".

Name of Sub-Bidder:

Project: Worcester Public Schools ADA Upgrades for Challenge & Reach, Gerald Creamer, Lincoln and Thorndyke Schools

Sub-Bid for Section: 21.00.00 Fire Protection

B. Each sub-bid submitted for work under this Section shall be on forms furnished by the City of Worcester as required by Section 44F of Chapter 149 of the General Laws, as amended. Sub-Bid forms may be obtained at the Enter Name and Address of location where forms may be obtained in person, or by written request.

C. Sub-bids filed with the City of Worcester shall be accompanied by a BID BOND or CASH or CERTIFIED CHECK or a TREASURER'S or CASHIER"S CHECK issued by a responsible bank or trust company payable to the City of Worcester in the amount of five (5) percent of the bid. A sub-bid accompanied by any other form of bid deposit than those specified will be rejected.

D. Additional Requirements:

1. Sub-bidder's attention is directed to Massachusetts G.L. Chapter 149 §44H, as amended, which provides in part as follows:
2. Each sub-bidder shall list in Paragraph E of the "Form for Sub-bids" the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the Section of the Specifications for that sub-subtrade requires such listing, provided that, in the absence of a contrary provision in the Specifications, any sub-bidder may, without listing any bid price, list his own name or part thereof and perform that work with persons on his own payroll, if such sub-bidders, after sub-bid openings, shows to the satisfaction of the Awarding Authority that he does customarily perform such class of work with persons on his

own payroll and is qualified to do so. This Section of the Specifications requires that the following classes of work shall be listed in Paragraph E under the conditions indicated herein.

Classes of Work Reference Specification Paragraphs

N/A

1.03 THE WORK DONE BY THIS SUB-BIDDER IS SHOWN ON THE FOLLOWING DRAWINGS:

A. Thorndyke Road Elementary School: FP1.01, FP1.02, FP1.03 and FP2.01.

1.04 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials, and equipment necessary to complete the work of this Section, including, but not limited to, the following:

1. Furnish all labor, materials, tools, equipment, supervision, services, and incidentals necessary for the installation of a complete "wet pipe" sprinkler system and "dry pipe" sprinkler system, complete and ready for standard operation. Systems shall be installed in all spaces, except where specifically noted otherwise. The system shall include an alarm valve, dry pipe valve, backflow preventer, check valves, sprinkler heads, and such other standard accessories as are necessary for a complete, approved system. The Fire Protection Subcontractor shall obtain all necessary permits, file all necessary drawings, obtain all approvals, and pay all fees required to complete the work of this Section. This system is only being installed at the Thorndyke Road Elementary School.

2. The Fire Protection Subcontractor shall furnish, install, move, and maintain in safe condition all rigging, hoisting, scaffolding, and staging as required for his use and for the proper execution of his work.

3. This Contractor shall be responsible for all seismic control for the entire sprinkler piping system and equipment.

4. The Fire Protection Subcontractor shall begin work at the flange terminated in Storage Room 103 by the Site Contractor. Flange location and elevation shall be coordinated by both Contractors.

5. This contractor is responsible for sleeving and coring all penetrations associated with the respective work. The General Contractor shall be responsible for firestopping all penetrations. This contractor must fully coordinate with the G.C. so as to identify all the locations requiring firestopping.

B. Design Criteria: Pipe sizing and sprinkler head layout shown on the Drawings is provided to indicate a suggested pipe routing, zoning, and sprinkler head location and shall not be used for estimating purposes. Location of piping and heads shall be coordinated with all other trades. Actual pipe sizing, types of heads, and layout shall be based on a hydraulically designed system in accordance with the requirements of NFPA 13, the Worcester Fire Department, and the

Insurance Underwriter. Location of sprinkler heads, in relation to the ceilings and walls and spacing of the heads, shall not exceed that permitted by NFPA 13 of the light occupancy specified (ordinary hazard occupancies in Boiler Room and Storage Rooms). The Fire Protection Subcontractor shall prepare working drawings and hydraulic calculations per NFPA 13, by a registered Fire Protection Engineer, and shall obtain Worcester Fire Department and Insurance Underwriter approval prior to start of work. The Fire Protection use the water flow data information from the Worcester DPW listed below and on the plans. Coordinate work of this Section with all trades to avoid interference with ductwork, HVAC and plumbing, piping, electrical, structural, etc. Final sprinkler head locations shall be subject to Architect-Engineer's approval. The number of heads and pipe sizes may be increased or reduced due to hydraulic calculations or the installation of revised heads, provided the revised heads are U.L. listed and FM approved and meet NFPA 13 and Insurance Underwriters' criteria. Additionally, all heads shall be centered with ceiling tile layout, except where indicated otherwise on the Drawings.

1. The attic shall be designed as light hazard occupancy as there is no gas fired equipment and it is fairly wide open space.
2. The current flow test data is as follows. Please note that the City of Worcester is going to perform a new flow test to verify this data.
   Date: August 21, 2024 Performed By: City of Worcester DPW
   Static Pressure = 40 PSI Residual Pressure = 40 PSI
   Pitot Tube Reading = 40 PSI Flow Rate = 1060 GPM
   Nozzle Size = 2-1/2” Nozzle Coefficient = 0.90 Smooth
   Hydrant Flow Test at 30 Thorndyke Road, Worcester

C. ALTERNATES: NONE

D. Items To Be Furnished Only: (NONE REQUIRED UNDER THIS SECTION)

E. Reference To Drawings: FP1.01, FP1.02, FP1.03 and FP2.01.

F. Related Work: The following items are not included in this Section and will be performed under the designated Sections:

1. SECTION GENERAL CONDITIONS OF THE CONTRACT.

   a. Cutting and drilling of holes larger than 2-1/2 in. diameter or square.
   b. Patching of all holes.

2. DIVISION 2 - WATER SYSTEMS.

   a. Water entrance into building and post indicator valve (if required).

3. DIVISION 7 - FIRE SAFING.

4. DIVISION 9 - PAINTING.

   a. All painting.

b. Site distribution system, including fire hydrants.

5. DIVISION 16 - ELECTRICAL WORK.

a. Wiring of fire alarm devices, tamper and flow switches provided under this Section including the electric alarm bell.
b. Wiring of air compressor for dry pipe system.
c. All electrical power and control wiring, line or low voltage.

G. Extent: The work required under this Section, without limiting the generality thereof, includes the furnishing of all labor, materials, equipment, and services necessary for, and reasonably incidental to, the complete installation of all piping, valves, sprinklers, and all other materials, equipment, and labor necessary, whether or not such items are specifically indicated on the Drawings or in the Specifications, to complete the fire protection systems in all respects ready for continuous and trouble free operation.

H. Intent: It is the intent of the Contract Documents to include all work and materials necessary for erecting complete, ready for continuous use, all fire protection systems as shown on the accompanying Drawings or as hereinafter described. These Drawings shall be taken in a sense as diagrammatic; sizes of pipes, etc., and methods of running them are shown, but it is not intended to show every offset and fitting, nor every structural difficulty that will be encountered during the installation of the work.

1.05 CODES, STANDARDS AND REFERENCES

A. All materials and workmanship shall comply with the latest editions of all applicable Codes, Local and State Ordinances, Industry Standards and Regulations.

B. The Fire Protection Subcontractor shall notify the Architect/Engineer of any discrepancies between the Contract Documents and applicable Codes, Standards, etc…

C. In the event of a conflict, the most stringent requirements shall apply.

D. The following Codes, Standards and References shall be utilized as applicable:

1. 2015 International Building Code.
2. Massachusetts State Building Code, 9th Edition.
3. 2017 National Electric Code (NEC).
4. Environmental Protection Agency (EPA).
5. Department of Environmental Protection (DEP).
6. Local Ordinances, Regulations of Town of Worcester.
7. National Fire Protection Association (NFPA).
8. Insurance Services Organization (ISO).
9. American National Standards Institute (ANSI).
10. American Society of Mechanical Engineers (ASME).
11. American Society for Testing and Materials (ASTM).
12. American Welding Society (AWS).

13. Commercial Standards, U.S. Department of Commerce (CS).
14. National Electrical Manufacturers Association (NEMA).
15. American Gas Association (AGA).
16. Underwriters' Laboratories, Inc. (UL).

1.06 SYSTEM DESCRIPTION

A. Wet Sprinkler System: Heat produced from a fire melts the fusible link or glass bulb on a single sprinkler head or group of sprinkler heads causing the sprinkler(s) to open. Water from the water filled pipe is discharge immediately from the sprinkler head(s) to control the fire. The fire department may pump into the system via the fire department connection to supplement the system. Sprinkler system water flow alarms activate upon system flow and indicate to the FACP an alarm condition. The sprinkler(s) continue to flow water until manually shut off.

B. Fire protection system for the two garages and wash bay shall be a dry system employing automatic sprinklers attached to a piping system containing air under pressure. Upon the opening of a sprinkler head the air flows out first which opens the dry pipe valve filling the pipes with water. Finally, water flows for the sprinkler head to suppress the fire.

1.07 SUBMITTALS

A. Refer to Division 1, SUBMITTALS for submittal provisions and procedures.

B. Submit for approval, within thirty (30) days after signing the Contract and prior to the submission of any shop drawings, an itemized list of manufacturers of material and equipment and of Subcontractors proposed to be used under this section

C. After approval of the list, submit for review a minimum of six (6) sets of detailed drawings. All shop drawings for equipment submitted for review shall include Specifications, including type of materials, operating pressures, capacities, performance and power requirements to determine compliance with Contract Documents. All data submitted shall be complete for all equipment and shall apply only to this specific project. Submit data sheets for the following:

1. Sprinkler fabrication drawings complete with hydraulic calculations.
2. Piping and appurtenances.
3. Indicators, alarms, gauges, switches, etc.
4. Sprinkler heads and cabinets.
5. Double check valve backflow assembly.
6. Flow switches.
7. Tamper switches.
8. Fire Department Connection (Siamese).
9. Valves, alarm test modules.
10. Alarm Check Valve and Dry Pipe Valve with all associated trim.
11. Dry pipe system accessories including air compressor, low pressure switch, etc.
12. Gate valves.
13. Electric bell.
14. Vibration and seismic control.

D. Regardless of any information included in the shop drawing submitted for review, the requirements of the Drawings and Specifications shall not be superseded in any way by the shop drawing review.

E. Each submittal shall be reviewed, stamped and certified prior to submission to the Architect. Such certification shall be made by the Owner or Corporate Office of the Contractor, or by a person duly authorized by the Owner to sign binding agreements for the Contractor. The certification shall state that the data and details contained on each shop drawing, layout drawing, catalog data and brochure has been reviewed by the Contractor and that it complies with the Contract Documents in all respects. Shop drawings, layout drawings, catalog data and brochures will not be reviewed and will be returned to the Contractor unchecked unless they are certified.

F. It is intended that the Contractor submit complete and accurate data at the first submission. If the shop drawing is returned marked “Resubmit” or “Not Accepted”, only one (1) additional submission will be permitted.

G. Equipment shall be of proper size for its allotted space. Equipment shall be disassembled as required, without invalidating the manufacturer’s warranty, so that it can be installed through regular window, door, and/or louver openings.

H. The shop drawings and manufacturer’s data shall be submitted in a timely manner sufficiently in advance to give ample time for checking, correcting, resubmitting and rechecking if necessary. No claim for delay will be granted for failure to comply with this requirement.

I. A minimum period of two (2) weeks, exclusive of transmittal time, will be required in the Engineer’s office each time shop drawings, layout drawings, catalog data and brochures are submitted or resubmitted for review. The time period shall be considered by the Contractor when scheduling his work.

J. Fabrication drawings and hydraulic calculations shall be submitted and stamped approval by the Worcester Fire Department and I.S.O. prior to submitting to the Architect for review. Fabrication drawings and hydraulic calculations shall bear the seal of registration of a qualified registered professional fire protection engineer.

1.08 QUALITY ASSURANCE

A. Installer Qualifications: Installation and alterations of fire protection: piping, equipment, specialties, accessories and repair and servicing of equipment shall be performed only by a qualified installer. The term "Qualified" means experienced in such work ("Experienced" shall mean having a minimum of 5 previous projects similar in size and scope to this project), familiar with all precautions required, and has complied with all the requirements of the authority having jurisdiction. Upon request, submit evidence of such qualifications to the Engineer. Refer to Division 1 Section: "Definitions and Standards" for definition for "Installers".

B. Qualifications for Welding Processes and Operators: Comply with the requirements of AWS D10.9, "Specifications for Qualifications of Welding Procedures and Welders for Piping and Tubing, Level AR-3".

C. All piping and equipment running within trusses must be supported from top chord of truss at panel point. For any alternate configurations or for heavy pieces of equipment coordinate fully with structural engineer for support location before installation.

D. Regulatory Requirements: Comply with the requirements of the following codes:

1. NFPA 13 - Standard for the Installation of Sprinkler Systems, current Edition.
2. NFPA 24 - Standard for the Installation of Private Fire Service Mains and Their Appurtenances 2002 Edition.
3. NFPA 1963 - Standard for Fire Hose Connections 2003 Edition.
4. 527 CMR – Board of Fire Prevention Regulations.
5. 780 CMR – Massachusetts State Building Code, Ninth Edition.
6. 2015 International Building Code.
7. UL Compliance: Fire protection system materials & components shall be Underwriter's Laboratories listed and labeled and for the application anticipated.

1.09 DELIVERY, STORAGE, AND HANDLING

A. The Fire Protection Subcontractor shall provide for the delivery of all his materials and fixtures to the building site when required so as to carry on his work efficiently and to avoid delaying his work and that of other trades.

B. The Fire Protection Subcontractor shall, at all times, fully protect his work and materials from injury or loss by others. Any injury or loss which may occur shall be made good without expense to the Owner. The Fire Protection Subcontractor shall be responsible for the proper protection of all his materials until the building is accepted by the Owner.

1.10 GUARANTEE/WARRANTY

A. The Fire Protection Subcontractor shall and hereby does warrant that all work executed and all equipment furnished under this Section shall be free from defects of workmanship and materials for a period of one (1) year from date of final acceptance of this work. The Fire Protection Subcontractor further agrees that he will, at his own expense, repair and replace all such defective work and all other work damaged thereby which becomes defective during the term of the Guarantee-Warranty.

1.11 RECORD DRAWINGS

A. Refer to DIVISION 1 - CONTRACT CLOSEOUT for Record Drawings.

B. Record Drawings shall reflect all changes from the Contract Drawings whether by Change Order or by field conditions. Principal dimensions shall be indicated of concealed work, fire protection lines, valves, and zone flow switches.

1.12 OPERATING INSTRUCTIONS

A. At the time of final acceptance, the Fire Protection Subcontractor shall furnish three (3) sets of complete instructions for the repair, maintenance, and operation of the systems.

B. The Fire Protection Subcontractor shall instruct and fully demonstrate to such person or persons as the Architect-Engineer and/or Owner may designate, regarding the care and use of the fire protection systems and all apparatus pertaining thereto. Provide four (4) hours of training.

1.12 CUTTING AND PATCHING

A. Cutting and/or patching of all openings and holes required for the installation of fire protection in the building shall be performed by the General Contractor. All work and materials shall be installed in such a manner and at such time to keep cutting and patching to a minimum. Location for openings shall be checked by the Fire Protection Subcontractor and error, due to failure to coordinate work with other Divisions, shall be the responsibility of the Fire Protection Subcontractor failing to coordinate, who shall make the corrections at his own expense.

B. Work shall include furnishing and locating sleeves or inserts required before the new walls are built, or be responsible for the cost of cutting and patching required for pipes where sleeves were not installed, or where incorrectly located. The Fire Protection Subcontractor shall do all drilling required for the installation of hangers.

C. Patching of all holes after installation of piping or equipment shall be performed by the General Contractor or appropriate tradesmen.

D. All piping, cutting, and threading shall be done in a location approved by the Architect-Engineer.

E. No pipe cutting or threading shall be done in areas where completed concrete floor slab is to remain as finished or be painted later. Should this area be necessary, the Fire Protection Subcontractor shall cover the entire working area with canvas tarpaulins in an approved manner.

1.14 CLEANING

A. The Fire Protection Subcontractor shall thoroughly clean and flush all piping and clean all equipment of all foreign substances inside and out before being placed in operation.

B. If any part of a system should be stopped or damaged by any foreign matter after being placed in operation, the system shall be disconnected, cleaned, and reconnected at no additional cost to the Owners.

C. During the course of construction, all pipes shall be capped to insure adequate protection against the entrance of foreign matter.

D. At all times, keep the premises clear of undue accumulation of rubbish.

E. Upon completion of all work under the Contract, the Subcontractor shall remove from the premises, all rubbish, debris, and excess materials created by his employees and shall be responsible for disposal of same.

1.14 COORDINATION OF TRADES

A. The Fire Protection Subcontractor shall give full cooperation to the Subcontractors of other trades, and shall furnish any information necessary to permit the work of all trades to be installed satisfactorily and with least possible interference or delay.

B. In areas where conflicts may occur, if so directed by the Architect-Engineer, this Subcontractor shall prepare composite sketches at a suitable scale, not less than 1/4 inch = 1 foot 0 inches, clearly showing how his work is to be installed in relation to the work of other trades.

C. Piping and other equipment shall not be installed in congested and possible problem areas by this Subcontractor without first coordinating the installation of same with other trades and the Architect-Engineer. This Subcontractor, at his own expense, shall relocate all uncoordinated piping and other equipment installed should they interfere with the proper installation and mounting of electrical equipment, HVAC, ductwork, piping and equipment, plumbing piping, hung ceilings, and others; structural finish to be installed by other trades.

D. This Subcontractor shall coordinate the elevations of all piping and equipment in hung ceilings for the installation of recessed lighting fixtures, duct boxes, etc. Conflicts shall be brought to the attention of the Architect-Engineer for a decision before the piping and/or equipment of other trades is installed.

E. In areas where, due to construction conditions, more than one trade is required to use common openings in chases, shafts and sleeves for the passage of conduits, raceways, piping, ductwork and other materials, this Subcontractor must plan and locate the positions of equipment to be furnished under this Section so that all items including piping and/or equipment of other trades may be accommodated within the space available. Location and positioning shall be done prior to installation of same and to the satisfaction of the Architect-Engineer.

F. This Subcontractor, before installing his work, shall see that it does not interfere with the clearances required for finished columns, pilasters, partitions or walls, as shown on the Contract Architectural or Structural Drawings showing foundations, floor plans, roof plans and details.

G. Piping work that is installed under this Contract, which interferes with the architectural design or building structure, shall be changed as directed by the Architect-Engineer, and all costs incidental to such changes shall be paid by this Subcontractor at no additional cost to the Owner.

1.16 COORDINATION DRAWINGS

A. This Subcontractor shall be responsible for preparing Coordination Drawings to coordinate his work with all other trades, indicating pipe locations and floor to center line elevations.

B. This Subcontractor shall submit fire protection Drawings and hydraulic calculations to the Architect-Engineer and the Fire Department for approval.

1.17 PERMITS, FEES, RULES AND REGULATIONS

A. Refer to Bidding and Contracting Requirements, including GENERAL CONDITIONS and SUPPLEMENTARY CONDITIONS, for requirements all of which shall be included as part of this Specification.

B. Give the proper Authorities all requisite notices or information relating to the work under this Section. Obtain and pay for all fees, licenses, permits and certificates. Comply with the rules and regulations of all Local, State and Federal Authorities having jurisdiction, the Codes, Standards, recommended practices and manuals of the National Fire Protection Association, I.S.O., the Worcester Fire Department and the Public Utilities Companies serving the building.

1.18 CERTIFICATES OF APPROVAL

A. Upon completion of all work, furnish, in duplicate, certificates of inspections.

1.19 SEISMIC RESTRAINTS

A. Installation of Fire Protection equipment, accessories and components shall be in accordance with the Seismic Requirements identified in the 2015 International Building Code and NFPA 13, 2013 Edition. The possible exception:
IBC 2015 → Section 16.13.1 → ASCE 7-10 13.1.4 (4) which states that “Mechanical and electrical components in Seismic Design Category B.” are exempt nonstructural components.” is valid for this facility.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Piping:

1. Unless otherwise noted, piping in general shall include all piping above ground from the blank flanged outlet provided in the Sprinkler Room by the Sitework Subcontractor.

2. Piping above ground and within the building shall conform to all requirements of NFPA 13 and shall be as follows:

a. Piping and fittings from water outlet provided by the Sitework Subcontractor (SECTION 02665 - WATER SYSTEMS) on the inlet of the backflow preventer shall be ductile iron, (cement lined), or cut-grooved end galvanized pipe and fittings.

b. All EXPOSED sprinkler piping, subject to vandalism shall be Schedule 40 black steel pipe with cast-iron flanged or screwed fittings, cut-grooved Schedule 40 black steel pipe or welded, suitable for 175 PSI working water pressure.

c. All CONCEALED sprinkler mains (above acoustical ceiling tiles and gypsum board ceilings and EXPOSED sprinkler piping in the Sprinkler Room & Storage Rooms downstream of alarm check valve, shall be Schedule 40 or Schedule 10 electric resistance welded light wall, steel pipe with rolled grooved ends, for piping 1-1/2 in. and larger, complete with suitable couplings and fittings for rolled grooved end steel pipe.

d. All CONCEALED piping and all EXPOSED sprinkler piping in Mechanical Equipment Rooms, 2 in. and smaller, shall be Schedule 40 black steel pipe with screwed fittings.

e. Galvanized Steel Pipe: ASTM A795, Schedule 40. Provide galvanized piping for all dry pipe piping if required by Owner's Insurance Underwriter, otherwise black steel pipe shall be allowed, except for piping outside.

f. All piping on the outlet side of the backflow preventer and up to the alarm valves shall be cut grooved Schedule 40 black steel pipe and fitting or flanged pipe and fitting.

f. Piping for inspector's test valves shall be galvanized pipe with screwed fittings.

g. Schedule 5 pipe with Victaulic Pressfit® fittings and couplings may be used in lieu of Schedule 40 pipe with screwed fittings. The Pressfit® shall be UL listed and FM approved for fire protection services to 175 psig.

3. Wherein before specified, piping systems shall be installed using mechanical pipe couplings of a bolted or mechanical locking device-type, with a central cavity design pressure-responsive gasket along with mechanical pipe fittings, flanges and grooved end valves and shall be approved for fire protection services. All grooved components shall be U.S. made and shall be approved by a single manufacturer and be installed per manufacturer's published literature.

   a. Rigid type couplings shall be ASTM A395 and A536 ductile iron, complete with angle pattern bolt pads to provide rigidity and support and hanging requirements corresponding to NFPA 13. Gaskets shall be EPDM-Type A.

      1. 1-1/4" through 4": Installation-Ready, for direct stab installation without field disassembly. Victaulic Style 009-EZ.
      2. 1-1/4" through 8": Victaulic FireLock™ Style 005.

   b. Flexible Type couplings shall be ASTM A395 and A536 ductile iron, for use in locations where vibration attenuation and stress relief are required, and for seismic applications in accordance with manufacturer's recommendations. Victaulic Style 75 or 77.

   c. Fittings shall be ASTM A 395 and A536 ductile iron, short pattern with flow equal to standard pattern. Victaulic FireLock™.

1. Where FireLock™ pattern is not available, Victaulic UL listed and FM approved standard fittings may be used.

d. Gaskets:

Fire Protection Service	Temp. Range	Gasket Recommendation
Dry Systems	Ambient	FlushSeal®, Grade EPDM, Type A
Water/Wet Systems	Ambient	Grade EPDM, Type A

e. All grooved components shall be U.S. made and shall be by a single manufacturer and be installed per manufacturer's published literature. Tools used for preparation of pipe shall be of the same manufacturer as the grooved components.

1. All castings used for coupling housings, fittings, valve bodies, etc., shall be date stamped for quality assurance and traceability.

4. Flexible Piping Systems (Optional)

a. Contractor shall provide flexible piping connection to sprinkler heads for both suspended and sheetrock ceiling. All flexible piping systems shall be UL Listed and FM Approved and suitable for their intended use.

b. All flexible piping connections to include a union threaded connection (no required welding) or fully welded (non-mechanical fittings), braided, leak-tested sprinkler drop with a minimum internal corrugated hose diameter of one inch (1”); and a one-piece multi-port ceiling bracket with removable attachment hub and self securing integrated snap-on clip-ends, for attachment to ceiling grid without the need for a screw fastener.

c. Acceptable manufacturer:

1) VicFlex as manufactured by Victaulic Company of Easton, PA USA (610) 559-3300 or Fax (610) 250-8817 in lengths of 2 feet to 6 feet.
2) FlexHead series 2000 as manufactured by Flexhead Industries of Holliston, MA USA (800) 829-6975 or (508) 893-9596, Fax (508) 893-6020 in lengths of 2 feet to 6 feet.
3) SprinkFlex® Flexible Sprinkler Hose Fittings as manufactured by Viking Corporation of Caledonia, Michigan USA (800) 968-9501 in lengths of 2 feet to 6 feet.

5. Where piping penetrates through walls, floors, and ceilings, the Fire Protection Subcontractor shall install pipe sleeves, complete with approved type fire safing at both ends.

B. Valves:

1. Gate valves shall be outside screw and yoke type, iron body with brass trim. They shall be Underwriters' Laboratories, Inc. listed and Factory Mutual approved and shall be designed for 175 pounds water working pressure. Screwed end gate valves shall be bronze and shall conform to Federal Specification WW-V-51. Grooved end gate valves shall be Victaulic Series 771. Check valves shall be of a type having ductile iron body, brass, PPS

(Polyphenylene Sulfide) coated, or nickel seat with brass, aluminum bronze, or elastomer encapsulated ductile iron discs, clearway swinging, designed for 250 pounds water working pressure, and shall be listed by Underwriters' Laboratories, Inc. and Factory Mutual approved. Grooved end check valves shall be Victaulic Series 717. Screwed end angle, check, and globe valves shall be bronze and shall conform to Federal Specification WW-P-501. If alarm valves are of a make or type incorporating a removable ring, diaphragm or a clapper facing, the Fire Protection Subcontractor shall furnish one (1) extra such item for each riser assembly.

2. Alarm check valves shall be approved vertical type for wet systems, complete with retard chamber, pressure switch, water motor gong, drain valve, pressure gauges, and other required trimmings. Alarm valve internal components shall be replaceable without removing the valve from the installed position. Grooved end alarm valves shall be Victaulic Co. Series 751, or engineer approved equal by Viking.

C. Sprinkler Heads:

1. Sprinkler heads shall be new, UL listed and FM approved type of intermediate temperature rating, except where excessive temperatures are anticipated. In such areas, appropriate higher temperature ratings shall be used in accordance with NFPA Standard No. 13. Heads installed where they might receive injury shall be protected with approved guards. Spacing of heads shall be for "light hazard" and "ordinary hazard" occupancy as required. Heads shall have 1/2 in. orifices. Pendant heads, where required, shall be listed by Underwriters' Laboratories, Inc. and approved by Factory Mutual Engineering Corporation as suitable for pendant use in the type of system in which installed.

   a. Wrenches shall be provided by the sprinkler manufacturer that directly engage the hex-shaped wrench boss integrally cast in the sprinkler body. Victaulic FireLock Series.

2. Exposed upright and pendent "wet pipe" sprinkler heads for "light hazard" shall be Reliable Automatic Sprinkler Co., Inc. Model F1FR, Viking model M or Victaulic V27 Series, quick response chrome plated.

3. For ACT or gypsum board ceiling installations as shown, Reliable Automatic Sprinkler Co., Inc. model #G4FR, Victaulic model #V3802 or approved equal, quick response, adjustable concealed standard pendent automatic sprinkler, white cover plate, 165°F temperature rating, 1/2” orifice, K-factor = 5.62.

4. Exposed Quick Response Horizontal Sidewall Sprinkler Heads as shown., Victaulic SIN #V2710, Reliable Automatic Sprinkler Co., Viking Group, or approved equal, quick response, 165°F temperature rating, 1/2” orifice, K-factor = 5.6.

5. Dry-type, quick response, horizontal sidewall sprinkler heads for “light hazard,” Victaulic model #V3610, Reliable Automatic Sprinkler Co., Inc. or approved equal, brass sprinkler cup & plain escutcheon, dry barrel length to be selected by contractor (2” to 36” length in 0.25” increments), 1” connection, K-factor = 5.6.

6. Dry-type, quick response, pendent sprinkler heads as shown shall be Victaulic model #V3614 or approved equal, 165°F temperature rating, 1/2" orifice, K-factor = 5.6.

7. Special Application Back--To-Back Attic Sprinkler Head, located under ridge beam. Tyco model #TY3180 (maximum attic width = 40 ft), brass upright sprinkler heads, ½" NPT connection, K-Factor = 5.6, model depends on roof span and roof pitch which are to be determined in the field. Approved equal by Victaulic, Reliable Automatic Sprinkler Co., Inc., Viking Group, Inc. or approved equal.

8. Sprinkler heads shall be FM approved and UL listed as manufactured by The Reliable Automatic Sprinkler Co., Inc., Viking Corporation, Tyco or equal. In all finish rooms or areas, sprinkler heads shall be chrome plated finish, complete with chrome plated escutcheons. Provide adjustable extended escutcheons where indicated on the Drawings or as required.

2.02 EQUIPMENT

A. Fire Department Pumper Connections:

1. Fire department pumper connections shall be provided in accordance with the requirements set forth in NFPA Standard No. 13 and shall include an automatic drip. Hose threads shall be National Standard Fire Hose Threads (ANSI B26), complete with standard cap with chains. The pumper connection shall have one (2) 2-1/2 in. inlets (Siamese) and one (1) 4 in. outlet (NPT), equipped with clapper. Fire department hose threads shall meet Worcester Fire Department standards. The Fire Department connections shall be as manufactured by Potter-Roemer, Guardian Fire Equipment Inc., Reliable Automatic Sprinkler Co. Inc., or approved equal. Note: Verify the style of fire department connection preferred by the Worcester Fire Department. A recent project has a Storz connection installed.

2. Fire department pumper connections shall be wall mounted siamese with cast brass body, brass plugs with chains, all with rough chrome finish and lettering on escutcheon reading "AUTOMATIC SPRINKLER."

3. Furnish and install 4 in. check valve with automatic ball drip, Potter-Roemer Model 5982, or approved equal.

4. At the low-point near each fire department connection, install a 90-degree elbow with drain connection to allow for system drainage to prevent freezing. Elbow shall be Victaulic #10-DR.

B. Sprinkler Cabinets: Sprinkler cabinets with a total of 12 sprinklers for each type of ratings installed and a sprinkler wrench shall be provided for each system and shall be installed at the main riser for each sprinkler system.

C. Pipe Supports:

1. Metal pipe supports, hangers, clamps, etc., and all other accessories shall be of an UL listed and FM approved pattern and so placed as to conform with the requirements of NFPA Standard No. 13. Spacing of hangers shall not exceed that recommended in ANSI B31.1. All Victaulic piping shall be supported with two (2) hangers per length of pipe.

2. All piping installed under this Section of the Specifications shall be independently supported from the building structure and not from the piping, ductwork, or conduit of other trades. All supplementary steel required to meet the requirements specified herein shall be furnished and installed by the Fire Protection Subcontractor and shall be subject to the approval of the Architect-Engineer.

D. Wall, Floor, and Ceiling Plates: Piping passing through floors, walls, and ceilings shall be provided with metal sleeves and chromium plated steel or nickel plated cast-iron plates. The spaces between piping and sleeves shall be filled with a noncombustible material.

E. Flow Switches:

1. Vane type waterflow switch with retard device, single pole double throw, "U" clamp, Gamewell Co. Series 9304 or equal by Potter Co., Notifier Co., or Gamewell, all at least Class 5 closed circuit.

2. All flow switches shall be equipped with a retard device, adjustable up to one (1) minute.

F. Valves Switches:

1. All sprinkler main valves and riser valves shall be furnished with supervision switches of the Universal Type OSYS-U as manufactured by Gamewell, Potter, Notifier Co., or approved equal.

2. This Subcontractor shall furnish and install a tamper switch on the post indicator valve. Wiring shall be by the Electrical Subcontractor.

G. Backflow Preventer:

1. Main Service Backflow Preventer: Watts model #709OSY or AMES model #2000ss double check valve/backflow preventer. Device shall be U.L. listed and FM approved complete with (2) two OS&Y shut-off valves. Provide one (1) complete rebuilding kit and deliver to Owner.

2. The Fire Protection Subcontractor shall be responsible for all permits, fees, and testing associated with the backflow preventer. Provide one (1) extra set of repair and rubber parts kits and one (1) Model TK-7-BFP test kit. All tests shall be certified by the Worcester Water Department.

3. Equal Backflow Preventer manufacturers are Watts Regulator, Febco, Wikins, or Conbraco.

H. Alarm Test Modules: Furnish and install AGF Manufacturing, Inc.'s UL listed and FM approved "Test and Drain" for the alarm test loops, where indicated on the Drawings, complete with combination sight glass/orifice. Pipe discharge to outdoors or building drain.

I. Valves with Built-In Tamper Switches:

1. Furnish and install, at each Flow Control Station, Milwaukee Valve Co.'s Model BBVSCS02 grooved ends, 175 PSI, slow-closing "Butterball" butterfly valves, complete with built-in tamper switch for 2-1/2 in. pipe size; Model BB-SCS02 for threaded pipe 2 in. and smaller.

2. Valves shall be Factory Mutual System approved and UL listed.

J. Waterflow Indicators: Waterflow indicators shall be the pressure or paddle type and shall be equipped with a self-winding, adjustable, recycling, non-thermal type signal-retarding device to prevent false alarms due to surges in the water system. The riser assembly shall include a pressure gauge, a main drain assembly, and any other equipment necessary to provide a complete installation, connected as indicated.

K. Alarm Facilities: Equipment necessary to accomplish a local waterflow alarm signal for each system, one (1) transmitted coded waterflow signal for each group of system(s) and a local trouble alarm for each supervisory system shall be installed in each sprinkler system.

1. Local Waterflow Alarm Facilities: Facilities shall consist of an outside water motor gong and an electric bell furnished and installed by this Subcontractor, mounted where indicated. Electric power supply required for local alarms shall be taken from the house-current supply line on the line side of the main switch through an independent switch and fuse block or circuit breaker.

2. Alarm signals shall be transmitted over the fire alarm transmission system.

3. Grouped Automatic Control Valves: Where two (2) or more alarm check valves, waterflow indicators, or any combination of these facilities are supplied through one (1) common underground branch connection, one (1) local waterflow signal and one (1) local low-air pressure signal shall be provided for each group.

L. Valve Tags and Markings:

1. Furnish and install brass tags with S-hooks stamped with letters and numbers attached to the stem of each valve throughout all the systems.

2. Furnish complete chart and flow diagram of entire system listing the valve number, fluid controlled, and zone reference location for all valves corresponding to the tag numbers. The chart shall be framed under glass and hung in the Mechanical Equipment Room where directed. Furnish two (2) extra copies of the chart to the Architect-Engineer.

3. Furnish and install a laminated red phenolic plate with engraved white lettering for each zone control flow switch and valve. Nameplates shall be located adjacent to all exposed and concealed valves.

M. Inspector's Test and Drain Connections:

1. Wet system test pipe shall not be less than 1 in. in diameter terminating in a smooth bore corrosion resisting orifice giving a flow equivalent to one (1) sprinkler. A test pipe shall be provided for each system. Each test connection valve shall be readily accessible and labeled. The discharge shall be to the outside, to an open drain connection capable of accepting full flow under system pressure, or to another location where water damage will not result.

2. Drain connections shall be provided when a change in piping direction prevents drainage of sections of branch lines or mains through the main drain valve. The drain shall consist of a valve not smaller than 3/4 in. size and plug, at least one of which shall be brass.

N. Identification of Piping Systems:

1. Furnish and install OSHA approved identification valve tags, labels and flow direction arrows for all piping and equipment included in this Section. Labels shall be as manufactured by Seton Name Plate Company, or W.H. Brady Company, or approved equal.

2. All pipes shall be color coded and marked to identify the fluid. Color coding shall conform to ANSI Bulletin A13.1 and OSHA 1910.262 for colors, location and sizes of bands and letters. Color coded tags can be used when pipes are too small for labeling.

3. Markers shall be semi-rigid plastic equal to Set Mark Type "SNA" by Seton, or approved equal. Markings shall be placed where pipes pass through walls, or partitions, at all valves, where flow changes direction, and at junctions of pipes. On long runs of pipes, markers shall be placed every 20 feet, or where necessary to avoid confusion as to identification of pipes.

4. Install color-coded adhesive dots on ceiling grids for locating shut-off valves above hung ceilings.

O. Dry Pipe System Accessories:

1. Provide Dry Pipe Valve: Viking model #F-1 latching differential valve with accelerator trim, model #E-1 accelerator, and model #B-1 anti-flood device.

2. Provide air compressor approved for dry pipe sprinkler system use with UL listed and FM approved dry valves and trim. Compressor shall maintain the required operating pressure of the dry system and be capable of charging the system with air within 30 minutes.

3. Provide one (1) Viking model E-1 compressors with check valves, pressure relief valve and adjustable pressure switches. 1/2 HP, 115 volts, 1phase, 60 Hz. Provide air filters, air pressure maintenance device, dehydrator, neoprene vibration isolating wall mounts and all necessary piping. Unit shall be mounted to wall and not to pipe.

4. Air Supervisory Pressure Switch: Viking model #07759 dual SPDT, UL listed, FM approved. Provide for low and high pressure alarm.

5. Alarm Pressure Switch: Viking model #07758 dual SPDT, UL listed, FM approved. Provide for flow alarm.

6. Electric Alarm Bell: System Sensor model SSM24-10 or SSV120-10 alarm bell. Coordinate with electrical/ fire alarm contractor for voltage and type of bell before ordering. Provide #WBB weatherproof backbox coordinating installation with others.

PART 3 – EXECUTION

3.01 EXAMINATION & PHASING

A. Examine walls for suitable conditions where cabinets are to be installed, where required.

B. Do not proceed until unsatisfactory conditions have been corrected.

C. Coordinate installation with work of other trades especially the HVAC contractor. Piping shall be coordinated with ductwork installation to maximize headroom in all areas.

3.02 PIPE APPLICATIONS

A. Install Schedule 40 steel pipe with threaded joints and fittings for 2 inch and smaller and with welded or mechanical joints for 2 1/2 inch or larger. See materials for exceptions to schedule weight.

1. For pipe sizes 2 inch and smaller, Schedule 5 steel with Victaulic Pressfit® fittings and couplings may be used.

B. Install black steel for sprinkler piping. Install galvanized steel piping as required by NFPA and for all piping downstream of inspector’s test valve.

C. Use approved fittings to make all changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

D. Install unions in pipes 2 inches and smaller, adjacent to each valve. Unions are not required on flanged devices or in piping installations using grooved mechanical couplings.

E. Install flanges or flange adapters on valves, apparatus, and equipment having 2-1/2 inch and larger connections. Install flange connection at all floor mains off of sprinkler risers.

F. Hangers and supports: Comply with the requirements of NFPA 13. Hanger and support spacing and locations for piping joined with grooved mechanical coupling manufacturer's written

instructions for rigid systems. Provide seismic bracing and protection from damage from earthquakes in accordance with NFPA 13 and state codes.

G. Make connections between underground and above-ground piping using an approved transition piece strapped or fastened to prevent separation.

H. Install test connections sized and located in accordance with NFPA 13 complete with shutoff valve. Test connections may also serve as drain pipes.

I. Install pressure gage on the riser or feed main at or near each test connection. Provide gage with a connection not less than 1/4 inch and having a soft metal seated globe valve, arranged for draining piping between gage and valve. Install gages to permit removal and where they will not be subject to freezing.

J. Install flow switches and tamper switches where shown on drawings and as required for wiring to control panel by Division 16.

K. All piping and equipment running within trusses must be supported from top chord of truss at panel point. For any alternate configurations or for heavy pieces of equipment coordinate fully with structural engineer for support location before installation.

3.03 PIPE JOINT CONSTRUCTION

A. Weld Joints: AWS D10.9, Level AR-3.

B. Threaded Joints: conform to ANSI B1.20.1, Tapered pipe threads for field cut threads. Join piping, fittings, and valves as follows:

1. Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
2. Align threads at point of assembly.
3. Apply appropriate tape or thread compound to the external pipe threads.
4. Assemble joint to appropriate thread depth. When using a wrench on valves, place the wrench on the valve end into which the pipe is being threaded.
5. Damaged Threads: Do not use pipe with threads which are corroded or damaged. If a weld opens during cutting or threading operations, that portion of pipe shall not be used.

C. Flanged Joints: Align flanges surface parallel. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly to appropriate torque specified by the bolt manufacturer.

D. Mechanical Grooved Joints: Cut or roll grooves on pipe ends dimensionally compatible with the couplings.

1. Cut or roll grooves on pipe ends dimensionally compatible with the couplings.

2. Pipe ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove.
3. Gasket should be lubricated with lubricant supplied by the manufacturer or approved for use with the gasket by the manufacturer.
4. The grooved coupling manufacturer's factory trained representative shall provide on-site training for contractor's field personnel in the use of grooving tools and installation of grooved joint products. The representative shall periodically visit the jobsite and review contractor is following best recommended practices in grooved product installation. (A distributor's representative is not considered qualified to conduct the training or jobsite visit(s).)

E. End Treatment: After cutting pipe lengths, remove burrs and fins from pipe ends.

3.04 VALVE INSTALLATIONS

A. General: Install fire protection specialty valves, fittings, and specialties in accordance with the Manufacturer's written instructions, NFPA 13 and the authority having jurisdiction.

B. Gate Valves: Install supervised open gate valves so located to control all sources of water supply except fire department connections. Where there is more than one control valve, provide permanently marked identification signs indicating the portion of the system controlled by each valve.

C. Install backflow preventers in each water supply connection.

3.05 SPRINKLER HEAD INSTALLATIONS

A. Use proper tools to prevent damage during installations.

B. Install sprinkler heads in the center of acoustical ceiling tiles. Where installed under sloped ceilings or roofs, install heads so deflectors are parallel with slope.

C. Install heads so that roof trusses, joists and mechanical equipment does not interfere with proper coverage.

D. Provide additional heads under mechanical ductwork and equipment exceeding 4' in width and as required to maintain complete coverage.

E. Do not install sprinklers that have been dropped, damaged, or show a visible loss of fluid. Never install sprinklers with cracked bulbs.

F. Sprinkler bulb protector shall be removed by hand after installation. Do not use tools or any other device(s) to remove the protector that could damage the bulb in any way.

3.06 WATER FLOW SWITCHES

A. All flow switches shall be located in a manner to allow proper access for service and repair. All switches shall be set with the control box on the top of the pipe. Devices may be mounted on a horizontal or vertical pipe. On horizontal pipe, they should be installed on the top side of the pipe where they will be accessible. The units should not be installed within 6 inches of a fitting which changes the direction of waterflow or within 24 inches of a valve drain.

3.07 SUPERVISORY SWITCHES

A. All supervisory switches shall be located in a manner to allow proper access for service and repair.

3.08 FIRE DEPARTMENT CONNECTION

A. Fire Department connections shall be set no less than 1’-6” or more than 3’-6” above outside grade.

3.09 ACCESS PANELS

A. Furnish and deliver access panels for access to all concealed parts of the Fire Protection System that require accessibility for the proper operation and maintenance of the system. Access panels shall be installed by the appropriate trades.

3.10 TESTING

A. The Fire Protection Subcontractor shall coordinate and perform all tests as required by NFPA 13 and NFPA 25, Insuring Agency, and the Worcester Fire Department at no expense to the Owner.

B. The scope of work consists of the furnishing of all labor, materials, tools, equipment, supervision, services, and incidentals necessary for the installation of an automatic sprinkler system installed complete and ready for standard operation. System shall be installed in all spaces indicated on the Drawings. The system shall include sprinkler risers connected to the water system, alarm check valve and appurtenances, circuit opener and closer, water motor alarm gong, zone valves, fire department pump connection, check valves, sprinkler heads and piping, and such other standard accessories as are necessary for a complete, approved system. The Fire Protection Subcontractor shall obtain all necessary permits, file all necessary Drawings, obtain all approvals, and pay all fees required to complete the work of this Section.

C. After the installation has passed a satisfactory hydrostatic test, all iron and steel parts shall be thoroughly cleaned. All piping and other items, except sprinkler heads, bronze or brass fittings, other corrosion resistant materials and moving parts, shall be given a priming coat of good quality, red lead type paint and a finish coat of paint, the color of which is to be determined by the Architect-Engineer.

END OF SECTION 21.00.00

SECTION 22.00.00

PLUMBING
(Filed Sub-Bid Required)

PART I - GENERAL

1.01 RELATED DOCUMENTS

A. Attention is directed to the general and supplementary conditions and Division 1 including all sub-divisions thereof as listed in the table of contents, which are hereby made a part of this Section.

B. All work shall comply with all federal, state and local codes and any other authorities having jurisdiction.

1.02 TIME, MANNER AND REQUIREMENTS FOR SUBMITTING SUB-BIDS

A. Sub-bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the Enter Name and Address for Place of Bid Openging at time and place stipulated in the "Invitation to Bid/Notice to Contractors".

Name of Sub-Bidder:

Project: Worcester Public Schools ADA Upgrades for Challenge & Reach, Gerald Creamer, Lincoln and Thorndyke Schools

Sub-Bid for Section: 22.00.00 Plumbing

B. Each sub-bid submitted for work under this Section shall be on forms furnished by the City of Worcester as required by Section 44F of Chapter 149 of the General Laws, as amended. Sub-Bid forms may be obtained at the Enter Name and Address of location where forms may be obtained in person, or by written request.

C. Sub-bids filed with the City of Worcester shall be accompanied by a BID BOND or CASH or CERTIFIED CHECK or a TREASURER'S or CASHIER"S CHECK issued by a responsible bank or trust company payable to the City of Worcester in the amount of five (5) percent of the bid. A sub-bid accompanied by any other form of bid deposit than those specified will be rejected.

D. Additional Requirements:

1. Sub-bidder's attention is directed to Massachusetts G.L. Chapter 149 §44H, as amended, which provides in part as follows:
2. Each sub-bidder shall list in Paragraph E of the "Form for Sub-bids" the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the Section of the Specifications for that sub-subtrade requires such listing, provided that, in the absence of a contrary provision in the Specifications, any sub-bidder may, without listing any bid price, list his own name or part thereof and perform that work with persons on his own payroll, if such sub-bidders, after sub-bid openings, shows to the satisfaction of the Awarding Authority that he does customarily perform such class of work with persons on his

own payroll and is qualified to do so. This Section of the Specifications requires that the following classes of work shall be listed in Paragraph E under the conditions indicated herein.

Classes of Work Reference Specification Paragraphs

N/A

1.03 THE WORK DONE BY THIS SUB-BIDDER IS SHOWN ON THE FOLLOWING DRAWINGS:

1. Lincoln Street Elementary School: DP1.01, DP1.02 and P1.01.
2. Thorndyke Road Elementary School: DP1.01, DP1.02, P1.01 and P1.02.
3. Challenge & Reach School: DP1.01 and P1.01.
4. Gerald Creamer School: DP1.01 and P1.01.

1.04 SCOPE

A. Perform work and provide material and equipment as required for a complete and operational plumbing system as shown on the Drawings and as specified in this Section. Completely coordinate with work of other trades and provide for complete and fully functional installation.

B. The work shall include, but is not limited to, the following major items of work:

1. Alterations, additions and/or removal of existing plumbing systems and fixtures within the renovated area in order to conform to new space requirements. Refer to demolition notes on the architectural and plumbing drawings for systems and fixture removals at all schools.

2. Gerald Creamer Center – Plumbing for new water coolers replacing existing and reworking plumbing for two lavatories. All other plumbing to remain.

3. Challenge and Reach Academy (Harlow) – Plumbing repair for two handicap water closets and two handicap lavatories. All other plumbing to remain.

4. Lincoln Streer School – Plumbing to relocate sink in existing counter and casework. Plumbing for new elevator with sump pump and oil interceptor piped to connect to the sanitary drainage system. Work includes an electronic trap primer valve and dedicated oil vent piping for the oil interceptor. All other plumbing to remain.

5. Thorndyke School – Plumbing to renovate five restrooms for handicap accessibility involving fixture removal, capping and/or reconfiguration of piping and new rough-in plumbing. This will include a floor drain with automatic trap primer valve and hose bib. Plumbing for new elevator with sump pump and oil interceptor piped to connect to the sanitary drainage system. Work includes an electronic trap primer valve and dedicated oil vent piping for the oil interceptor. All other plumbing to remain.

6. Complete sanitary waste and vent systems connecting to the existing piping in walls or chases or above ceiling. Installation shall be in accordance with the Commonwealth of Massachusetts Plumbing Code and all other applicable codes and authorities having jurisdiction.

7. Complete cold and hot water piping systems connecting to the existing piping in walls or chases or above ceiling. Installation shall be in accordance with the Commonwealth of Massachusetts Plumbing Code and all other applicable codes and authorities having jurisdiction. All new water piping shall be insulated.

8. New plumbing fixtures and equipment as scheduled and specified.

9. New elevators to be installed at the Lincoln Street School and Thorndyke School. Furnish and installed automatic sump pumps piped to oil interceptors then to sanitary sewer. Any oil vents must run independently from sanitary vents up through the roof. The inlet to the oil interceptors shall have a trapped standpipe with indirect waste connection from sump pump discharge. These will require electronic trap primer valves to keep the traps wet, with all associated piping.

10. Obtain all permits and approvals required for work under this Section.

1.05 COORDINATION

A. Before starting work, visit site and examine conditions under which work shall be performed including preparatory work by others. Report conditions which might adversely affect the work in writing to the Architect. Do not proceed with the work until the defects have been corrected and conditions are satisfactory. Commencement of work shall be construed as acceptance of preparatory work and existing conditions.

B. Completely coordinate with work of other trades and provide for complete and fully functional installation. Although not specifically shown, provide supplementary or miscellaneous items, devices, appurtenances and materials incidental to or necessary for sound, secure and complete installation.

C. This contractor is responsible for sleeving and coring all penetrations associated with the respective work. The General Contractor shall be responsible for firestopping all penetrations in accordance with section – Firestopping. This contractor must fully coordinate with the G.C. so as to identify all the locations requiring firestopping.

1.06 RELATED WORK

A. Carefully examine all of the Contract Documents for requirements which affect work of this Section.

B. Other specification sections which directly relate to the work of this Section include, but are not limited to, the following:

- Section 23.00.00 – HVAC
- Section 26.00.00 – Electrical

C. The following related work will be performed by other Divisions of the specifications:

1. Cutting and patching of masonry, concrete, tile and other parts of structure, with the exception of drilling for hangers. Any piping penetrations not sleeved by this division at time of floor slab pouring or wall construction shall be core drilled by this division. Coordinate with Architect.
2. Installation of access panels in ceilings and walls. Access panels shall be furnished by this Section.
3. Painting, except as specified herein.
4. Electric power wiring for all equipment. Control wiring shall be performed by this Section.
5. Structural supports except as specified herein.
6. Temporary light, power, water, heat, gas and sanitary facilities for use during construction and testing.

1.07 CODES, STANDARDS AND AUTHORITIES

A. Perform all work in strict accordance with all rules, regulations, standards, codes, ordinances and laws of local, state and Federal governments, and other authorities having lawful jurisdiction, and be responsible for compliance therewith. Such authorities include but are not limited to the following: NFPA, OSHA, AGA, & EPA.

B. Give notices, file plans, obtain licenses and permits, pay fees and backcharges and obtain necessary approvals from authorities having jurisdiction.

C. Material and equipment shall be Underwriters' Laboratories (UL) listed for the service for which it is being used.

D. Whenever two or more codes, regulations, etc., conflict with each other or with the Contract Documents, the more severe requirements shall govern the conduct of the work.

1.08 GUARANTEE

A. Guarantee work performed under this Section in accordance with Division 1, General Requirements. Operation of systems or equipment for temporary services does not constitute beginning of guarantee period.

B. The Contractor also agrees to furnish service of the equipment for the above period, such service to be rendered quickly and promptly at the request of the Owner. This shall not be misconstrued to include routine maintenance.

1.09 CONTRACT DOCUMENTS

A. Plumbing drawings do not limit responsibility of determining full extent of work required by Contract Documents. Locations shown on drawings shall be checked against construction proper.

B. Drawings are diagrammatic and indicate general arrangement of systems and work of this Contract.

1.10 DISCREPANCIES IN DOCUMENTS

A. Where Drawings or Specifications indicate discrepancies or are unclear, advise Architect in writing before award of Contract. Otherwise, Architect's interpretation of documents shall be final and no additional compensation shall be permitted due to discrepancies or unclear items.

B. Where Drawings or Specifications do not coincide with recommendations of the manufacturer of a material or piece of equipment, this shall be brought to the attention of the Architect in writing before installation of item in question. Otherwise, make changes in installation as Architect requires without additional cost to the Owner.

1.11 RECORD DRAWINGS

A. Maintain record drawings during construction in accordance with the General Conditions of the Contract.

1.12 SUBMITTALS

A. Submit five copies of shop drawings and product data to Architect for approval. Any deviation from the Contract Documents, or proposed substitution of materials or equipment for those specified, must be requested by the Contractor in a separate letter, whether the deviations are due to field conditions, standard shop practices or other cause. Where any deviation or substitution is permitted, the Contractor shall fully coordinate all related changes to Architectural, Structural, Fire Protection, HVAC, Electrical or other work, and shall accomplish these related changes at no additional cost to the Owner. Refer to the general submittal requirements.

B. Submit shop drawing or product data for the following:

1. Plumbing fixtures, faucets, supports and accessories.
2. Piping, valves (full port ball valves) and accessories.
3. Pipe insulation.
4. Floor Drain.
5. Hose Bib.
6. Water Hammer Arrestors.
7. Access panels.
8. Automatic Sump Pump for Elevator Pit
9. Oil Interceptor.

1.13 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Prior to the final inspection, the Plumbing Contractor shall provide to the Architect three (3) sets of operating and maintenance instructions. The Architect shall review the instructions for completeness prior to turning them over to the Owner.

B. Instructions: The Contractor shall provide qualified, factory-trained manufacturers' representative to give detailed instruction to assigned Owner personnel in the operation and complete maintenance for all equipment. All such training will be at the job site.

PART 2 - PRODUCTS

2.01 PRODUCTS CRITERIA

A. Standard Products: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least 3 years. See other specification sections for any exceptions.

B. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.

C. Nameplates: Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped or otherwise permanently marked on each item of equipment.

D. Asbestos products or equipment or materials containing asbestos shall not be used.

E. Lead free products shall be used for all piping, fittings, valves, faucets and any other component that comes in contact with potable water.

2.02 PLUMBING FIXTURES

A. Provide plumbing fixtures as specified herein. Fixture trim, traps, faucet, escutcheons and waste pipes exposed to view in finished spaces shall be I.P.S. brass with polished chromium plating over nickel finish. Fixtures shall have manufacturer's label or trademark indication first quality.

B. Fixtures with wall outlet flanges shall be set proper distance from floor or wall to make first-class joint with closet setting compound or gasket.

C. Mounting heights shall be as shown on architectural details.

D. Each individual fixture shall be provided with supply stops for each water service. Supply stops and supply risers shall be lead-free to meet NSF-61G.

E. Exposed piping below handicap lavatories shall be insulated with PVC coated insulation similar to Truebro LavGuard 2, McGuire Mfg. Co. Inc., Plumberex Specialty Products Pro-Extreme, or approved equal. The product shall be rigid high-impact, stain-resistant PVC, 1/8” constant wall thickness with internal ribs, have UV protection, and have an E-Z Tear-To-Fit trim feature. The color shall be china white and shall be Compatibility #100 series to fit all 1-1/4” or 1-1/2” cast brass or tubular P-trap assemblies and 3/8” or ½” angle stop assemblies.

F. Fixture Schedule: Unless otherwise specified, fixtures shall be as follows (Note: Model numbers are provided to set standard of fixture) :

1. China Fixtures including Water Closets, Urinal and Lavatories: American-Standard, Kohler Company, Zurn ZPPG, Eljer Plumbingware Inc., Crane Plumbing, Toto USA, Sloan Valve Company or equal.
2. Manual Flush Valves: Sloan Valve Company, Zurn ZPPG, Delta Faucet Company, Moen Commercial, Hydrotek or equal.
3. Metering Faucets: Sloan Valve Company, Symmons Industries, Zurn ZPPG, Delta Faucet Company, Moen Commercial or equal.
4. Water Cooler with Bottle Filler: Elkay Sales Inc., Halsey Taylor, Oasis Corporation, Haws Corporation, Filtrine, Murdock or equal.

LINCOLN STREET ELEMENTARY SCHOOL – NO NEW FIXTURES

THORNDYKE ROAD ELEMENTARY SCHOOL

P-1 Wall Hung Water Closet (Child Handicap): American Standard model #3351.101 "Afwall Flowise" wall hung high efficiency toilet with Everclean®, 1.1 – 1.6 GPF, vitreous china, direct-fed siphon jet flush action, condensation channel, elongated front bowl, 1-1/2" top spud, fully glazed 2-1/8" trapway, 10"x12" water surface area, 100% factory flush tested; white; one year warranty.
Sloan Royal model #111-1.6, code #3010000; exposed water closet flushometer for wall hung top spud bowls. Flushometer shall be quiet, exposed, diaphragm type, chrome plated for left or right hand supply (see plans), water closet type with the following features:

- PERMEX™ synthetic rubber diaphragm with dual filtered fixed bypass.
- ADA compliant metal oscillating non-hold-open handle with triple seal handle packing.
- 1" I.P.S. screwdriver Bak-Chek® angle stop with free spinning vandal resistant stop cap.
- Adjustable tailpiece.
- High back pressure vacuum breaker flush connection with one-piece bottom hex coupling nut
- Spud coupling and flange for 1-1/2" top spud.
- Sweat solder adapter with cover tube and cast wall flange with set screw.
- High copper, low zinc brass castings for dezincification resistance.
- Non-Hold-Open handle, fixed metering bypass and no external volume adjustment to ensure water conservation.
- Flush accuracy monitored by CID™ Technology.
- Diaphragm, stop seat and vacuum breaker molded from PERMEX™ rubber compound for chloramines resistance.

Bemis #495SSC extra heavy weight, thermoset fireproof material, elongated, open front seat, less cover with integral molded-in bumpers, self-sustaining and external check hinge feature 300 series stainless steel posts that hold seat in any raised position up to 11 degrees beyond vertical, color white. Church #9500SSCT, Kohler #K-4731, or approved equal.
Zurn Industries, Jay R. Smith, Josam or equal hub and spigot combined waste fitting and chair carrier supports, with adjustable extensions, rear foot support and face plate with foot support & feet bolted to floor, with seat mounting height to be 15" above finished floor.

P-2 Floor Mount Water Closet (Handicap): American Standard model #2234.001 "Madera Flowise" 15" Height Elongated Flushometer Toilet, high efficiency toilet with Everclean®, 1.1 – 1.6 GPF, vitreous china, direct-fed siphon jet flush action, condensation channel, elongated front bowl, 1-1/2" top spud, fully glazed 2-1/8" trapway, 15" rim height, 10"

to 12" roughing-in, 10"x12" water surface area, 100% factory flush tested; white, 2 bolt caps; one year warranty.
Sloan Royal model #111-1.6, code #3010000; exposed water closet flushometer for wall hung top spud bowls. Flushometer shall be quiet, exposed, diaphragm type, chrome plated for left or right hand supply (see plans), water closet type with the following features:

- PERMEX™ synthetic rubber diaphragm with dual filtered fixed bypass.
- ADA compliant metal oscillating non-hold-open handle with triple seal handle packing.
- 1" I.P.S. screwdriver Bak-Chek® angle stop with free spinning vandal resistant stop cap.
- Adjustable tailpiece.
- High back pressure vacuum breaker flush connection with one-piece bottom hex coupling nut
- Spud coupling and flange for 1-1/2" top spud.
- Sweat solder adapter with cover tube and cast wall flange with set screw.
- High copper, low zinc brass castings for dezincification resistance.
- Non-Hold-Open handle, fixed metering bypass and no external volume adjustment to ensure water conservation.
- Flush accuracy monitored by CID™ Technology.
- Diaphragm, stop seat and vacuum breaker molded from PERMEX™ rubber compound for chloramines resistance.

Bemis #495SSC extra heavy weight, thermoset fireproof material, elongated, open front seat, less cover with integral molded-in bumpers, self-sustaining and external check hinge feature 300 series stainless steel posts that hold seat in any raised position up to 11 degrees beyond vertical, color white. Church #9500SSCT, Kohler #K-4731, or approved equal.

P-2A Floor Mount Pre-K Water Closet (Handicap): American Standard model #2282.001 "Baby DeVoro Flowise" 10-1/4" Rim Height, Elongated Bowl, Flushometer Toilet, high efficiency toilet 1.28 – 1.6 GPF, vitreous china, direct-fed siphon jet flush action, 1-1/2" top spud, fully glazed trapway, 10" roughing-in, 100% factory flush tested; white, 2 bolt caps; one year warranty.
Sloan Royal model #111-1.6, code #3010000; exposed water closet flushometer for wall hung top spud bowls. Flushometer shall be quiet, exposed, diaphragm type, chrome plated for left or right hand supply (see plans), water closet type with the following features:

- PERMEX™ synthetic rubber diaphragm with dual filtered fixed bypass.
- ADA compliant metal oscillating non-hold-open handle with triple seal handle packing.
- 1" I.P.S. screwdriver Bak-Chek® angle stop with free spinning vandal resistant stop cap.
- Adjustable tailpiece.
- High back pressure vacuum breaker flush connection with one-piece bottom hex coupling nut
- Spud coupling and flange for 1-1/2" top spud.
- Sweat solder adapter with cover tube and cast wall flange with set screw.
- High copper, low zinc brass castings for dezincification resistance.
- Non-Hold-Open handle, fixed metering bypass and no external volume adjustment to ensure water conservation.
- Flush accuracy monitored by CID™ Technology.
- Diaphragm, stop seat and vacuum breaker molded from PERMEX™ rubber compound for chloramines resistance.

Bemis #495SSC extra heavy weight, thermoset fireproof material, elongated, open front seat, less cover with integral molded-in bumpers, self-sustaining and external check hinge feature 300

series stainless steel posts that hold seat in any raised position up to 11 degrees beyond vertical, color white. Church #9500SSCT, Kohler #K-4731, or approved equal.

P-3 Wall Hung Urinal (Handicap): American Standard model #6590.005 "Washbrook Flowise 0.5" wall hung high efficiency urinal, 0.5 GPF, vitreous china, flushing rim, elongated 14" rim from finished wall, washout flush action, extended sides for privacy, ¾" top inlet spud, outlet connection threaded 2" inside (NPTF), 2 wall hangers; white; one year warranty.
Sloan Royal model #186-0.5, code #3912697; exposed high efficiency manual urinal flushometer for top spud high efficiency urinals. Flushometer shall be quiet, exposed, diaphragm type, chrome plated, urinal type with the following features:

- Dual linear filtered bypass diaphragm .
- ADA Compliant metal oscillating Non-Hold-Open handle with triple seal handle packing
- 3/4" I.P.S. screwdriver Bak-Chek® angle stop with free spinning vandal resistant stop cap.
- Adjustable tailpiece.
- High back pressu
- re vacuum breaker flush connection with one-piece bottom hex coupling nut
- Spud coupling and flange for 3/4" top spud.
- Sweat solder adapter with cover tube and cast wall flange with set screw.
- High copper, low zinc brass castings for dezincification resistance.
- Non-Hold-Open handle, fixed metering bypass and no external volume adjustment to ensure water conservation.
- Flush accuracy monitored by CID™ Technology.
- Diaphragm, handle packing, stop seat and vacuum breaker molded from PERMEX™ rubber compound for chloramines resistance.

Provide Zurn #Z1222 concealed carrier, Jay R. Smith, Josam or equal carrier, with bearing and hanger plates,(vandalproof trim) or provide carrier as required to suit construction, with feet bolted to floor. Install with rim at 15" above finished floor (child height)

P-4 Wall Hung Lavatory (Child Handicap): American-Standard #0954.004 "Murro" wall-hung bathroom sink (Kohler model #K-1997 "Brenham"), 22" deep x21-1/4" wide, vitreous china, wall hung, rear overflow, 4" faucet hole centers, recessed self-draining deck, for concealed arm support.
Symmons Scot #SLC-6000 Metering/Temperature Selection Lavatory Faucet with blade type handle. Cast brass 4" centerset with temperature limit stop to adjust outlet temperature and time limit stop to adjust flow time, includes (2) in-line check/screen assemblies. Spray outlet with vandal resistant 0.5 gpm flow rate aerator which limits water flow to a maximum of 0.25 gallons per cycle; 3/8" copper supply tubes; maximum 30 second closing time; polished chrome.
McGuire MFR Co. ICF Defender series LFCK series angle stops available in IPS, sweat and compression connections, integral check valve, spring actuated, completely serviceable, 3-year warranty, loose key (not wheel handle); flexible or rigid risers, escutcheons; 1-1/4" x 1-1/2" polished chrome plated cast brass adjustable "P" trap, cleanout plug, extension to wall with escutcheon.
Offset grid drain.
Chicago #STC-11-11-AB Heavy Duty lead-free, loose key stops and supplies with flexible riser and flange. 1-1/4" x 1-1/2" polished chrome plated cast brass adjustable "P" trap, cleanout plug, extension to wall with escutcheon.

Concealed arm carrier support with foot support to suit construction. Install with rim at 30" per MAAB.
Provide undersink insulation on all piping below lavatory as specified in section 2.2.E.

P-5 Bi-Level Water Cooler with Bottle Filler: Elkay model #LZSTL8WSLK "ezH2O Bottle Filling Station & Versatile Bi-Level ADA Cooler, Filtered, Refrigerated, Light Gray" with the following features: Chilling Capacity of 8.0 GPH (gallons per hour) of 50° F drinking water, based on 80° F inlet water and 90° F ambient, per ASHRAE 18 testing. Features shall include Antimicrobial*, Filtered, Green Ticker™, Hands Free, Laminar Flow, Real Drain, Visual Filter Monitor. Furnished with Flexi-Guard ® Safety Bubbler. Electronic Bottle Filler Sensor with Electronic Front and Side Bubbler Pushbar activation. Product shall be Wall Mount (On Wall), for Indoor applications, serving 2 station(s). Unit shall be certified to UL 399 and CAN/CSA C22.2 No. 120. The specific features notes above are:

- Visual Filter Monitor: LED Filter Status Indicator for when filter change is necessary.
- Filter is certified to NSF 42 and 53 for lead, cyst, particulate, chlorine, taste and odor reduction. 3,000 gal. capacity.
- Green Ticker: Informs user of number of 20 oz. plastic water bottles saved from waste.
- Laminar flow provides clean fill with minimal splash.
- Key plastic components are manufactured with silver ion antimicrobial agent helping to provide clean, stain- and odor-free surfaces.
- Real Drain System eliminates standing water.

Provide angle stop and "P" trap with cleanout for the fountain drains.
Provide in-wall carrier for Bi-Level On-Wall Bottle Fillers Coolers and Fountains, Elkay model #MLP200. Mount so that the handicap bubbler discharge is 36" above the finished floor.

CHALLENGE AND REACH SCHOOL

P-1 Wall Hung Lavatory (Adult Handicap): Existing Lavatory Fixture to remain.
Symmons Scot #SLC-6000 Metering/Temperature Selection Lavatory Faucet with blade type handle. Cast brass 4" centerset with temperature limit stop to adjust outlet temperature and time limit stop to adjust flow time, includes (2) in-line check/screen assemblies. Spray outlet with vandal resistant 0.5 gpm flow rate aerator which limits water flow to a maximum of 0.25 gallons per cycle; 3/8" copper supply tubes; maximum 30 second closing time; polished chrome.
McGuire MFR Co. ICF Defender series LFCK series angle stops available in IPS, sweat and compression connections, integral check valve, spring actuated, completely serviceable, 3-year warranty, loose key (not wheel handle); flexible or rigid risers, escutcheons; 1-1/4" x 1-1/2" polished chrome plated cast brass adjustable "P" trap, cleanout plug, extension to wall with escutcheon..
Chicago #STC-11-11-AB Heavy Duty lead-free, loose key stops and supplies with flexible riser and flange. 1-1/4" x 1-1/2" polished chrome plated cast brass adjustable "P" trap, cleanout plug, extension to wall with escutcheon.
Concealed arm carrier to be reused, if possible.
Provide undersink insulation on all piping below lavatory as specified in section 2.2.E.

GERALD CREAMER CENTER

P-1 Bi-Level Water Cooler with Bottle Filler: Elkay model #LZSTL8WSLK "ezH2O Bottle Filling Station & Versatile Bi-Level ADA Cooler, Filtered, Refrigerated, Light Gray" with the following features: Chilling Capacity of 8.0 GPH (gallons per hour) of 50° F drinking water, based on 80° F inlet water and 90° F ambient, per ASHRAE 18 testing. Features shall include Antimicrobial*, Filtered, Green Ticker™, Hands Free, Laminar Flow, Real Drain, Visual Filter Monitor. Furnished with Flexi-Guard ® Safety Bubbler. Electronic Bottle Filler Sensor with Electronic Front and Side Bubbler Pushbar activation. Product shall be Wall Mount (On Wall), for Indoor applications, serving 2 station(s). Unit shall be certified to UL 399 and CAN/CSA C22.2 No. 120. The specific features notes above are:

- Visual Filter Monitor: LED Filter Status Indicator for when filter change is necessary.
- Filter is certified to NSF 42 and 53 for lead, cyst, particulate, chlorine, taste and odor reduction. 3,000 gal. capacity.
- Green Ticker: Informs user of number of 20 oz. plastic water bottles saved from waste.
- Laminar flow provides clean fill with minimal splash.
- Key plastic components are manufactured with silver ion antimicrobial agent helping to provide clean, stain- and odor-free surfaces.
- Real Drain System eliminates standing water.

Provide angle stop and "P" trap with cleanout for the fountain drains.
Provide in-wall carrier for Bi-Level On-Wall Bottle Fillers Coolers and Fountains, Elkay model #MLP200. Mount so that the handicap bubbler discharge is 36" above the finished floor.

P-2 Wall Hung Lavatory (Adult Handicap): Existing Lavatory to Remain
Symmons Scot #SLC-6000 Metering/Temperature Selection Lavatory Faucet with blade type handle. Cast brass 4" centerset with temperature limit stop to adjust outlet temperature and time limit stop to adjust flow time, includes (2) in-line check/screen assemblies. Spray outlet with vandal resistant 0.5 gpm flow rate aerator which limits water flow to a maximum of 0.25 gallons per cycle; 3/8" copper supply tubes; maximum 30 second closing time; polished chrome.
McGuire MFR Co. ICF Defender series LFCK series angle stops available in IPS, sweat and compression connections, integral check valve, spring actuated, completely serviceable, 3-year warranty, loose key (not wheel handle); flexible or rigid risers, escutcheons; 1-1/4" x 1-1/2" polished chrome plated cast brass adjustable "P" trap, cleanout plug, extension to wall with escutcheon.
Existing drain piping to remain.
Chicago #STC-11-11-AB Heavy Duty lead-free, loose key stops and supplies with flexible riser and flange.

2.03 PIPE MATERIALS

A. All soil, waste and vent lines in accessible areas 2 in. and larger shall be cast-iron "no-hub," ASA group 022 pipe and fittings joined with "Clamp-All," or equal; on pipe sizes 3 in. and larger, use four (4) band clamps, two (2) band clamps will only be allowed on 2 in. pipe. All buried soil, waste and vent lines shall be service weight cast-iron pipe with all fittings carefully fitted and caulked together with oakum and lead, sealed gas and watertight. Minimum size of piping below ground shall be 2 in. Where it is impractical to install cast-iron pipe, as in tight partition work or where the sizes of lines are smaller than 2 in., Type "L" copper tubing shall be used conforming to ASTM Specification with sweat type fitting using lead free solder and non-corrosive flux,

"Non-Korrode," or approved equal, conforming to ASTM Specification B-32 alloy 50A. In lieu of oakum and lead joints, "push on type" resilient gasket fittings may be used on buried pipe only. Provide extra heavy cast-iron for urinal connection.

1. Furnish and install hubless soil pipe couplings designated Heavy Weight (HW), made of extra wide, heavy duty corrugated type 304 stainless steel with axially slotted heavy duty, worm drive clamps tightened to 80 in lbs. of torque. Flanged gaskets to be made of neoprene rubber, meeting the requirements of ASTM C 564, with sealing rings under each stainless steel clamp. Manufacturers shall be Mission Heavy Weight, Husky 4000, Clamp-All 125, Ideal-Tridon or equal.

B. All vent lines 2 in. and smaller shall be Type "L" copper, or DWV, except minimum size below ground shall be 2 in. Minimum vent terminal through roof shall be 4 in. except otherwise noted. Vent flashing at the roof shall be by the Roofing Contractor.

C. All hot water amd cold water piping within the building shall be hard copper Type "L" seamless drawn tubing assembled with sweat fittings. All solder used shall be lead free, cadmium free, "Silverbrite - 100," or approved equal, complying with the latest issue of ANSI A-5.8 publication. All exposed runs to all toilet fixtures and sinks shall be chrome plated.

1. Mechanical grooved pipe couplings, fittings, Mechanical T's, and other products are acceptable to be used on piping systems and mechanical equipment connections 2"diameter and larger (in lieu of welded/flanged and threaded methods) in systems specified. Operating conditions not to exceed -30°F to 250°F temperature range according to the gasket lining selected and working pressures as shown in the coupling manufacturer's current product specifications.
   a) Copper Piping Systems: Grooved piping products for use with ASTM B88 hard Type L copper tubing shall be copper tubing sized. (Flaring of pipe ends to IPS dimensions is not allowed.) Fittings shall be ASTM B75 or B152 wrought copper or ASTM B584-87 bronze sand casting. Couplings shall be ASTM A395 and A536 ductile iron, with angle pattern bolt pads for rigidity upon visual confirmation of metal-to-metal bolt pad contact with no torque requirement. Coupling housings coated with copper colored alkyd enamel. Gaskets shall be Style "EHP" EPDM grade to suit the intended service. Gaskets used on potable water systems shall be EPDM, UL classified in accordance with ANSI / NSF61 for both hot (180F) and cold (86F) potable water service.

2. Press Fitting: Copper press fittings shall conform to the material and sizing requirements of ASME B16.18 or ASME B16.22. O-Rings for copper press fittings shall be EPDM.
   a) Manufacturers of Copper Press Fittings:
   Viega, 17545 Daleview Dr., Lakewood, OH 44107, (877) 620-0016;
   Rigid Tool Company, 400 Clark Street, Elyria, OH 44035, (800) 519-3456;
   Elkhart Products Corporation "Xpress Press-Connect Fittings", 1255 Oak Street, Elkhart, Indiana 46515, (800) 284-4851
   Nibco Press System, 1516 Middlebury Street, Elkhart, IN 46516-4740, (800)234-0227
   Conex Banninger >B< Press, IBP Group, LLC, (904) 217-4970

3. Vic-Press 304™ Fittings: In lieu of alternate piping methods, Vic-Press 304™ may be used on piping systems 1/2" through 2” in size. Pipe shall be ASTM A312 .Schedule 10 type 304/304L stainless steel.. Fittings and couplings shall be precision cold drawn austenitic stainless steel, complete with synthetic rubber O-ring. O-ring grade to suit the intended service. O-rings used on potable water systems shall be EPDM, UL classified in accordance with ANSI / NSF61 for potable water service.
   a) Manufacturers of Vic-Press 304™ Fittings: Victaulic Company of America
4. Solder Standard: Solder metal shall conform to the requirements of ASTM B32. Soldering fluxes shall conform to ASTM B813. Solder and fluxes used in drinking water systems shall have a maximum of 0.20-percent lead (Pb) content.

2.04 VALVES

A. Each valve type shall be of same manufacturer and appropriate for service in which used, valves shall be Milwaukee, Watts, Apollo, Nibco or approved equal. Valves shall comply with all requirements of the Massachusetts Plumbing and Fuel Gas Code; type proposed for each service shall be submitted for approval.

B. Each system shall be provided with valves as required by Code and as specified. Valves shall be installed for isolation and to facilitate operation, replacement and repair. Provide access panels where valves are concealed behind non-removable ceilings or walls. Provide shut-off valves for water supply piping to individual fixtures. Provide shut-off valves with drains at the base of every CW and HW riser and at each bathroom group. In addition provide drain valves with cap and chain at the base of each riser so that individual risers may be shut down and drained.

C. Ball Valves:

1. On water lines inside the building, ball valves 3 in. and smaller shall be as manufactured by Consolidated Valve Industries, Inc.'s "Apollo" 95-200-03 Series stop and drain with 1-1/4 in. extended stems for piping 1/2 in. to 1 in. size; 77-100/200 Series with 1-1/4 in. extended stems for piping 1-1/4 in. to 2-1/2 in. size. Valves shall be provided with stainless steel ball, reinforced Teflon seats and seals, bronze body, 400 PSI WOG, positive l00 percent shutoff. Valves 4 in. in size shall be equal to "Apollo" 82-24A-01 with extended stem. Ball valves shall be full port style.

2. Drain valves at all low points shall be "Apollo" 78-100 or 78-200 Series, 1/2 in. or 3/4 in. solder by 3/4 in. hose end with attached dust cover cap and chain.

3. Ball valves shall be of one (1) manufacturer, Conbraco Industries, Inc., "Apollo," Watts Regulator, Nibco/Scott, or approved equal.

D. Check valves shall be furnished and installed where indicated on the Drawings. Checks up to 3 in. shall be Class 125, solder ends, body and caps shall be ASTM B 62 cast bronze composition, swing type disc, Stockham Figure B-309.

2.05 TRAPS

A. Provide separate traps with integral cleanouts on fixtures and equipment requiring connections to sanitary system. Exceptions are fixtures with integral traps. Traps exposed to view, including connecting drain lines, shall be chrome plated. No trap shall be less than 1-1/2 inch and shall be sized as required by Code.

B. Traps shall be service weight cast-iron where buried in floors or serving floor drains with trap primer connections where noted on the Drawings. Where traps are not connected directly under the drain they serve in the floor, they shall be fitted with top cleanouts and extensions to the floor with access covers and plates.

C. Furnish and install traps at inlet to oil interceptor with standpipe and funnel for indirect waste connection from automatic sump pump. Provide vent for p-trap combined with trap from oil interceptor and run independently up through the building and through the roof.

2.06 INSULATION

A. All new hot water and cold water piping shall be insulated with Manville FLAME-SAFE fiberglass pipe insulation, Owens-Corning Fiberglass 25, Knauf or approved equal. The insulation shall have an average thermal conductivity not to exceed .25 BTU in. per sq. ft. per F. per hour at a mean temperature of 75 degrees F. Thickness of the insulation shall be 1/2 in. for cold water piping up to and including 2 in., 1 in. thick for cold water piping 2-1/2 in. and above, and 1 in. for hot water and hot water recirculating piping. Jacket shall be FLAME-SAFE AP. The insulation shall be applied over clean dry pipe with all joints butted firmly together. Longitudinal jacket laps and the butt strips shall be smoothly secured with Benjamin Foster 85-20 adhesive.

B. All fittings and valves shall be insulated with the proper factory pre-cut fiberglass insulation and covered using the factory, pre-molded, one-piece PVC fitting covers secured with flexible off-white 10 mil polyvinyl chloride film bonded with a specially formulated adhesive that can be installed indoors and out with a strong permanent bond conforming to MIL Spec. No. 7798-A.

C. All exposed supply and waste piping to handicapped lavatories shall be insulated with Truebro Model 101W or 102W "Handi-Lav-Guard" trap and hot water insulation kits with accessory no. 105. Equal manufacturers are McGuire Mfg. Co. Inc., Plumberex Specialty Products Pro-Extreme, or approved equal.

2.07 HANGERS

A. Hangers shall support piping from building structure to maintain required grade and pitch of pipe lines, prevent vibration, secure piping in place and provide for expansion and contraction. Hangers shall be adjustable clevis type; trapeze hangers may be used where conditions permit.

B. Hanger spacing shall conform to requirements of state and local plumbing codes; in no case shall horizontal piping be supported at intervals greater that 8 ft.

C. Hanger rods shall be connected to beam clamp as required to attach to the building construction. No ram-set or shot shields will be allowed.

2.08 JOINTING COMPOUNDS

A. Provide pipe dope, Teflon tape, wax rings, neoprene gaskets and other jointing compounds as required by best standard practice and only on service as recommended by the manufacturer. Work shall conform to manufacturer's recommendations with regard to use of putties, jointing compounds or both in installing plumbing fixtures and trim.

2.09 FLOOR DRAIN (THORNDYKE SCHOOL)

A. Provide floor drains of the type specified hereinafter; drains shall be Zurn, Jay R. Smith, Josam, Mifab, Watts Drainage or equal. Provide suitable clamping device and extensions if required, where installed in connection with waterproofing membrane.

B. FD-1**:** Jay R. Smith model #2010C-B-U square top or equal Duco cast iron body floor drain with flashing collar and adjustable strainer head, 5" square nickel bronze strainer head, 2" bottom outlet, 1/2" trap primer valve connection

2.10 AUTOMATIC TRAP PRIMER VALVE (THORNDYKE SCHOOL)

A. Furnish and install automatic trap primers where indicated or required as manufactured by Precision Plumbing Products, Model P-1 or P-2, as noted on the Drawings, with vacuum breaker and adjustment set screw.

B. Provide distribution unit(s) as required to supply multiple floor drains as manufactured by Precision Plumbing Products.

C. Provide automatic trap primer valves of the type specified above; trap primers shall be Precision Plumbing Products (PPP Inc.), Mifab, Sioux Chief Mfg. Co. or approved equal.

2.11 ELECTRONIC TRAP PRIMER VALVE (THORNDYKE SCHOOL and LINCOLN STREET SCHOOL)

A. Furnish and install electronic trap primers where indicated or required as manufactured by Precision Plumbing Products, Model MP-500-115V Mini-Prime Electronic Trap Primer, or approved equal.

1. Unit is designed for use with 1 to 4 floor drain. The trap primer valve make-up water line to floor drain is recommended to be a minimum of 12" above the p-trap before a 90° elbow can be installed. The furthest recommended distance of makeup line is approximately 20 feet to p-trap. Trap primer make-up line must have a continuous slape to the floor drain.

B. Power requirements are 120V-1Ø, 60 Hz, 0.11 Amps Hold Current, 0.23 Amps In-Rush (largest current draw).

C. Electronic trap primer features include:

1. Solder Joints: 95-5 lead free, containing lead not in the excess of 0.2%.
2. Electric Components: Circuit Breaker, Test Switch, Timer, Solenoid Valve – UL Listed.
3. Temperature / Pressure: 32°F - 125°F, 20 PSI – 150 PSI. Minimum 2 oz water at 20 PSI per drain served.
4. Inlet/Outlet: ½”NPT Male ANSI/ASME B1.20.1 / ½”NPT Female ANSI/ASME B1.20.1
5. Includes integral stainless steel screen and 1” air gap fitting. Distribution unit not required.

2.12 HOSE BIBB (THORNDYKE SCHOOL)

A. Interior hose bibbs shall be Woodford Model 24, Josam, Zurn, Mifab, or Wade,or equal; chrome plated, vacuum breaker, hose connection, loose T key. Provide at each bathroom group and in Boiler Room.

2.13 CLEANOUTS

A. Cleanouts shall be provided in soil and waste pipes and on below grade radon piping at changes in direction, where shown on Drawings, and at other points required by Code so that lines will be readily accessible for cleaning or rodding out; provide a minimum of 24 inch clearance for rodding. Cleanouts shall be same size as pipe in which they are installed but not larger than four inches.

B. Cleanouts shall be installed so that cleanout opens in direction of flow of drainage line served or at right angles thereto. Cleanout plug shall be kept free of dirt and construction materials and shall not be covered with cement, plaster or other permanent finishing materials.

C. Floor cleanouts shall have cast iron body and frame with square adjustable scoriated secured nickel bronze top. Unit shall be vertically adjustable for a minimum of two inches. When waterproofing membrane is used, provide clamping collar. Cleanouts shall consist of "Y" fittings and 1/8 inch bends with brass or bronze screw plugs. Cleanouts in tile floors shall have square top covers recessed for tile insertion; in carpeted areas, provide carpet cleanout markers. Floor cleanout shall be Zurn 1400 Series Level-trol Supreme cleanouts and Type ZN-1400-Z in terrazzo floors, Type ZN-1400-TX in tiled floors, Type ZN-1400-CM in carpeted floors, and Type ZN-1400 in all other locations. Cleanouts shall be set flush and level with top of finished floor surface except in carpeted areas where they shall be flush with concrete.

D. Provide cleanouts a base of vertical stacks with cleanout plug located approximately 30 inches above floor. Extend cleanouts to wall with access covers. Cleanout shall consist of sanitary tees. Furnish nickel-bronze square frame and cover with minimum opening 6 x 6 inches at each wall cleanout.

E. In horizontal runs above grade, cleanouts shall consist of cast brass screw plug in fitting or in caulked cast iron ferrule.

F. Wall cleanouts shall be brass, recessed head plugs with Zurn ZN1441 with round cover.

G. Provide floor and/or wall cleanouts of the type specified above. Cleanouts shall be Zurn, Jay R. Smith, Josam, Mifab, Watts Drainage or equal.

2.14 WATER HAMMER ARRESTORS

A. Maintenance free water hammer arrestors shall be furnished and installed at all locations in the water systems where quick acting valves are installed as well as wherever water hammer may occur. Examples of such locations are as follows:

1. Self-closing and metering faucets.
2. Flush Valves.

B. Water hammer arrestors shall be as manufactured by Josam Manufacturing Company, J.R. Smith Manufacturing Company, Zurn Systems, Watts Drainage Products or Precision Plumbing Products, Inc. Arrestors shall be installed at each and every multiple of fixtures or items as listed above, water hammer arrestors may serve groups of fixtures. Sizing and placement shall be in accordance with PDI Standard PDI-WH-201 and the manufacturer's recommendations. Provide access panels.

C. Water hammer arrestors shall be as follows:

	Type	Fixture Unit Rating	Model
1.	SA "A"	1-11	Jay R. Smith 5005
2.	SA "B"	12-32	Jay R. Smith 5010

2.15 PIPE IDENTIFICATION AND VALVE TAGS

A. All piping, except that piping which is within inaccessible chases, shall be identified with semi-rigid plastic identification markers equal to Seton or approved equal Setmark pipe markers or Marking Services Inc. . Direction of flow arrows are to be included on each marker. Each marker background shall be appropriately color coded with clearly printed legend to identify the contents of the pipe in conformance with the "Scheme for the Identification of Piping Systems" (ANSI 13.1-1981). Setmark snap-around markers shall be used above six inch overall diameters up to six inches and strap-around markers shall be used above six inch overall diameters. Markers shall be located adjacent to each valve, at each branch, at each cap for future, at each riser take off, at each passage through wall, at each pipe passage through floors, at each pipe passage to underground and on vertical and horizontal piping at 20 foot intervals maximum. All non-portable water lines and outlets shall be identified in accordance with the requirements of the Massachusetts Uniform State Plumbing Code.

B. All valves shall be designated by distinguishing numbers and letters carefully coordinated with a valve chart. Valve tags shall be 19 gauge polished brass, 1-1/2 inch diameter with stamped black filled letters similar to Seton S type 250-BL or approved equal. Lettering shall be 1/4 inch high for type service and 1/2 inch for valve number. Tag shall be attached to valves with approved brass "S" hooks, or brass jack chin. Whenever a valve is above a hung ceiling, the valve tag shall be located immediately above the hung ceiling.

C. Furnish a minimum of two typed valve lists to be framed under glass or plexi-glass. Each chart shall be enclosed in an approved .015 inch thick plastic closure for permanent protection. Valve numbers shall correspond to those indicated on the Record Drawings and on the printed valves lists. The printed list shall include the valve number, location and purpose of each valve. It shall state other necessary information such as the required opening or closing of another valve is to be opened of closed. Printed framed valve lists shall be displayed in each Mechanical Room or in location designated by the Owner.

D. Equipment nameplates shall be 3/4 inch by 2-1/2 inch long .02 inch aluminum with a black enamel background with engraved natural aluminum letters similar to Seton Style 2065-20. Nameplate shall have pressure sensitive taped backing.

E. Provide a brass will plaque, minimum .020 inch thickness, secured to the exterior wall just above the grade line for all buried serviced entrances or exits. Samples of such are: Water Service Below; Sanity Sewer Below; Kitchen Waste Below; Storm Drain Below; etc.

2.16 ACCESS PANELS

A. Furnish access panels for access to all parts of the plumbing systems that require accessibility for the proper operation and maintenance of the system.

B. Size shall be sufficient for the purpose, but no less than 12 inches by 18 inches. Particular attention shall be exercised in the selection of doors for masonry walls in order that frame sizes used will match the courses of brick or block.

C. Access doors shall be prime coated of rust inhibitive paint, continuous hinge and manufactured by Inland Steel Products Company “Milcor”, Acudor, Mifab, Miami-Carey or Walsh-Hannon-Galdwin, Incorporated “Way Loctor”. Type shall be based upon “Milcor” as follows:

1. Suspended Drywall Ceilings: Style ATR with 16 gauge frame, 18 gauge panel and flush screwdriver operated cam locks.

2. Gypsum Walls and Ceilings: Style K with 16 gauge frame, 14 gauge panel and flush screwdriver operated cam locks.

3. Masonry Non-Rated Walls: Style M with 16 gauge frame, 14 gauge panel and flush screwdriver operated cam locks.

4. Masonry Non-Rated Wall: Fire rated with UL 1-1/2 hour “B” rating, 16 gauge frame, 20 gauge sandwich type insulated panel, self-latching lock having interior release mechanism, and key operated cylinder lock keyed as required to suit requirements of the Architect.

5. Non-Rated Dry Walls: Style DW with 16 gauge frame, 14 gauge panel screwdriver operated cam locks.

2.17 ELEVATOR SUMP PUMP, SP-1 (THORNDYKE SCHOOL and LINCOLN STREET SCHOOL)

A. Furnish and install one (1) Zoeller model #BN153 Automatic Sump Pump with the following features:
- Durable, cast iron construction.
- Corrosion-resistant, powder coated epoxy finish.
- Stainless steel lifting handle.
- Assembled with stainless steel bolts.
- Non-clogging, engineered thermoplastic, vortex impeller design.
- Model 153: ½ HP, passes ¾" spherical solids.
- Motor: 3450 RPM, oil-filled, hermetically sealed, automatic reset thermal overload protected.
- Carbon/Ceramic seals.
- Upper sleeve bearing and lower ball bearing running in bath of oil.
- 20' UL listed power cord with molded 3-wire plug.
- 1-1/2"NPT vertical discharge.
- BN standard model includes a 20' variable level float switch.
- Operates at temperatures to 130F in effluent applications.
- ½ HP, 115V - 1Ø power, 10.5 Amps.

2.18 INTERIOR OIL/WATER SEPARATOR, OIL-1 (THORNDYKE SCHOOL and LINCOLN STREET SCHOOL)

A. Furnish and install Striem Oil Reserve™ oil/sand separator model OS-50 or approved equal. The unit shall be lifetime guaranteed and made in USA of seamless, rotationally-molded polyethylene. Separator shall be furnished for above or below grade installation, with field adjustable riser system, snap-in flow control and (2) vent connections. Separator flow rate shall be 50 GPM. Separator oil capacity shall be 40 gallons. Sand capacity shall be 7 gallons. Cover shall provide water/gas-tight seal and have a maximum 2,000 lbs load capacity.

PART 3 - EXECUTION

3.01 SPECIAL RESPONSIBILITIES

A. Cooperate and coordinate with other trades in executing work of this Section. Perform work such that progress of entire project including work of other trades shall not be interfered with or delayed. Provide information on items furnished under this Section to be installed by other Sections.

1. Obtain detailed information from manufacturers of equipment as to proper method of installation. Give full information so that openings required for work of this Section might be coordinated with other work and other openings and many be provided for in advance. In case of failure to provide information, cutting and patching will be done at the expense of this Section to the satisfaction of the Architect.

2. Notify Architect of location and extent of existing piping and equipment not shown on the Drawings which interferes with new construction. With approval of Architect, relocate

existing equipment to permit new work to be installed as required by Contract Documents. With approval of Architect, remove non-functioning or abandoned piping and equipment.

B. During progress of work, remove and properly dispose of resultant dirt and debris and keep premises reasonably clean. Upon completion of work, remove equipment and unused material provided for work.

C. Conduct work so as not to interfere with functioning of existing sewer, water and gas mains. Extreme care shall be observed to prevent debris from entering piping. Confer with Architect as to disruption of water service or their utilities due to testing or connection of new work to existing.

D. All piping and equipment running within trusses must be supported from top chord of truss at panel point. For any alternate configurations or for heavy pieces of equipment coordinate fully with structural engineer for support location before installation.

3.02 MATERIALS AND WORKMANSHIP

A. Work shall be executed in a workmanlike manner and shall present neat appearance when completed. Piping shall rum concealed except in mechanical rooms and areas where no hung ceiling exists. Material and equipment shall be installed according to manufacturer's recommended best practice.

B. Materials and equipment shall be new, unless otherwise noted.

3.03 SLEEVES AND INSERTS

A. Sleeves for piping between floors and through firewalls or smoke partitions shall be installed with approved packing between sleeves and piping to provide firestop. Coordinate with G.C. requirements.

B. This contractor is responsible for sleeving all pipe penetrations before pouring of slab. If additional holes are required this contractor shall core drill such holes in coordination with the general contractor and with prior consent of the Architect.

3.04 SANITARY, WASTE AND VENT PIPING

A. Interior horizontal storm drain, sanitary and waste piping shall be installed in practical alignment at uniform grade of 1/8 inch per foot minimum up to1/4 inch per foot if possible or if required by code such as for waste piping smaller than 4”. Coordinate invert of tie-ins to site piping with site contractor. Piping within building shall be coordinated closely with the work of other trades, in particular the HVAC ductwork.

3.05 CLEANOUTS

A. All cleanouts shall be set flush with walls or floors. Finish shall be protected during construction with proper covering. Flush floor cleanouts shall be coordinated so as to not be located beneath any partitions, casework nor beneath any non-potable equipment.

3.06 VALVES

A. All valves shall be furnished and installed under this Section shall be located in a manner to allow proper access for service and repair.

B. In no case shall valve stem and handle on a gate or globe valve be installed below the center line of the pipe it serves.

3.07 JOINTS AND CONNECTIONS

A. Joints and connections of piping shall be made permanently gas and water tight.

B. Dielectric couplings or unions shall be used where dissimilar piping materials are joined.

3.08 INSULATION

A. Insulation shall be applied over clean dry pipe with all joints butted firmly together and sealed with butt strips. Insulation shall run through all hangers and sleeves and have an 18 gauge sheet metal saddle equal to three (3) times the pipe diameter in length, on all pipes over 2 in. in diameter.

B. All fittings, valves, and exposed supply and waste piping to the handicapped lavatories, etc., shall be insulated as specified. The ends of the insulation shall be tucked snugly into the throat of the fitting and the edge adjacent to the pipe covering tufted and tucked in fully insulating the pipe fitting. The one-piece PVC fitting cover shall then be secured by taping the ends to the adjacent covering.

3.09 FIXTURE CARRIERS

A. All carriers shall be of the hub and spigot type and quality as required under each fixture. Each face plate shall be firmly bolted to floor with 1/2 in. rods.

B. Single closet carriers shall have the rear foot anchored to floor with 1/2 in. rod.

3.10 FIXTURES

A. Fixtures shall be the best product of the manufacturer, shall be without defects in construction or appearance, shall be set true and level, and shall be firmly supported in place without rocking or strain. Fixtures shall be adjusted for proper operation and shall be tested in the presence of the Architect-Engineer. All fixtures shall be thoroughly cleaned and all labels, stickers, and dirt marks shall be removed.

B. The installation of all backing for plumbing fixtures and their accessories not affecting the structure shall be the work of the Plumbing Trade Contractor. Cutting and chasing which does not affect the structure shall also be the work of the Plumbing Trade Contractor. All cutting and chasing, and installation of all backing for fixtures and accessories, which affects the structure, shall be the work of the Carpenters and/or General Contractor.

3.11 ADJUSTMENT

A. Adjust all flush valves, pressure reducing valves, meter faucets, and water temperature controllers, water heater, and recirculation pumps for proper outlet temperatures and pressure.

B. The Plumbing Trade Contractor shall be responsible for adjusting and balancing the entire domestic hot water recirculation system. Provide recirculation pump balance report.

3.12 ACCESS PANELS

A. Furnish and deliver access panels for access to all concealed parts of the Plumbing System that require accessibility for the proper operation and maintenance of the system. Access panels shall be installed by others.

3.13 DISINFECTION

A. The domestic water distribution piping system shall be thoroughly disinfected with solution containing not less than 50 parts per million of available chlorine. Solution shall be introduced into system for period of eight hours, during which time valves and faucets shall be opened and closed several times. After disinfection, solution shall be flushed from system with clean water until residual chlorine content is not greater than 0.2 parts per million.

3.14 CLEANING

A. Upon completion of work but prior to final system testing, all parts of installation shall be thoroughly cleaned. Fixtures, pipe, valves and fittings shall be completely cleaned of grease, metal cuttings, dirt, etc. Protective covers shall be removed and fixtures shall be cleaned and ready for use.

3.15 TESTING

A. Provide testing of plumbing systems as required by authorities having jurisdiction, including Owner and Architect. Tests shall be conducted as part of work of this Section and shall include labor, equipment, apparatus and services required to perform tests. All tests results shall be documented and signed off on by the Owner, Architect and Engineer.

B. Prior to final acceptance, furnish Architect with certificates of testing and inspection for plumbing systems indicating approval of authorities having jurisdiction and conformance with requirements of Contract Documents.

C. Notify Architect and authorities involved at least 48 hours prior to testing and inspection. Do not paint, cover or conceal work prior to testing, inspecting and obtaining approval.

D. Provide temporary piping and connections for testing, flushing or draining systems to be tested. Leaks, damage or defects discovered or resulting from test shall be repaired or replaced to like-new condition. Piping must be absolutely tight before it will be accepted and joints shall be made tight without caulking.

E. Tests for Plumbing Systems: Soil, waste, vent, gas, and water piping shall be tested by the Plumbing Trade Contractor and approved before acceptance. Underground soil, rain conductor, and waste piping shall be tested prior to backfilling. Equipment required for tests shall be furnished by the Plumbing Trade Contractor at no additional cost to the Owner. All tests shall be witnessed and approved by the Plumbing Inspector.

F. Drainage And Venting System Piping: All vent, soil, waste, acid waste, acid vent, and rain conductor shall be tested with water or air before the fixtures are installed.

1. Water Test: Water test shall be applied to the drainage and venting system in their entirety or in sections. If the entire system is tested, all openings in the pipe shall be tightly closed, except the highest opening, and the system shall be filled with water to the point of overflow. If the system is tested in sections, each opening, except the highest opening of the section under test, shall be tightly plugged and each section shall be filled with water and tested with at least a 10 ft. head of water. In testing successive sections, at least the upper 10 ft. of the next preceding section shall be tested so that each joint of pipe in the building, except the uppermost 10 ft. of the system, has been submitted to a test of at least 10 ft. head of water. The water shall be kept in the system, or in the portion under test, for at least two (2) hours before the inspection starts. The system shall be tight at all joints.

2. Air Test: If tests are made with air, a pressure of not less than 5 lbs. per sq. in. shall be applied with a force pump and maintained at least one (1) hour without leakage.

G. Water System: When the roughing-in is complete, and before fixtures are set, the entire hot water recirculation and cold water piping system shall be tested at a hydrostatic pressure of not less than 125 PSI gauge and proved tight at this pressure for not less than four (4) hours in order to permit inspection of all joints. Where a portion of the water piping system is to be concealed before completion, this portion shall be tested separately as specified for the entire system. All water entrance piping up to PRV-station shall be tested at 50 PSI in excess of the street pressure, but not to exceed 200 PSI.

H. Defective Work: If inspection or test indicates defects, such defective work or material shall be replaced or repaired as necessary and inspection and tests repeated. Repairs to piping shall be made with new materials. No caulking of screwed joints or holes will be acceptable.

3.16 LUBRICATION

A. After complete installation by the Contractor of any equipment which depends on lubrication for efficient operation, the Contractor shall properly lubricate per instructions of the manufacturer. This shall be done before any test runs or final operation.

3.17 TRASH AND DEBRIS REMOVAL

A. The General Contractor shall provide dumpsters for use by all trade contractors. During the course of the work, at the end of each work day, trade contractors shall clean up trash and debris caused by their work, and deposit it in the dumpsters, or, at the trade contractor's option, haul it away and dispose of the trash legally. The trade contractor shall do a thorough cleaning of all their debris after scaffold and staging has been removed from an area.

B. Comply with the requirements of Section CONSTRUCTION WASTE MANAGEMENT, for removal and disposal of construction debris and waste.

3.18 LABELING

A. Provide pipe markers of either pressure sensitive tape or laminated plastic, color coded and indicating the type and direction of flow of the plumbing service. All exposed CW, HW and gas piping exposed in the mechanical room shall be labeled. Hot water of varying temperatures shall be labeled as such. All valves isolating sections of the building or fixture groupings shall include stamped brass valve tags.

END OF SECTION 22.00.00

SECTION 23 00 00

HVAC
(Filed Sub-Bid Required)

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

B. All work shall comply with all federal, state and local codes and any other authorities having jurisdiction.

1.02 TIME, MANNER AND REQUIREMENTS FOR SUBMITTING SUB-BIDS

A. Sub-bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the Enter Name and Address for Place of Bid Openging at time and place stipulated in the "Invitation to Bid/Notice to Contractors".

Name of Sub-Bidder:

Project: Worcester Public Schools ADA Upgrades for Challenge & Reach, Gerald Creamer, Lincoln and Thorndyke Schools

Sub-Bid for Section: 23.00.00 HVAC

B. Each sub-bid submitted for work under this Section shall be on forms furnished by the City of Worcester as required by Section 44F of Chapter 149 of the General Laws, as amended. Sub-Bid forms may be obtained at the Enter Name and Address of location where forms may be obtained in person, or by written request.

C. Sub-bids filed with the City of Worcester shall be accompanied by a BID BOND or CASH or CERTIFIED CHECK or a TREASURER'S or CASHIER"S CHECK issued by a responsible bank or trust company payable to the City of Worcester in the amount of five (5) percent of the bid. A sub-bid accompanied by any other form of bid deposit than those specified will be rejected.

D. Additional Requirements:

1. Sub-bidder's attention is directed to Massachusetts G.L. Chapter 149 §44H, as amended, which provides in part as follows:
2. Each sub-bidder shall list in Paragraph E of the "Form for Sub-bids" the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the Section of the Specifications for that sub-subtrade requires such listing, provided that, in the absence of a contrary provision in the Specifications, any sub-bidder may, without listing any bid price, list his own name or part thereof and perform that work with persons on his own payroll, if such sub-bidders, after sub-bid openings, shows to the satisfaction of the Awarding Authority that he does customarily perform such class of work with persons on his own payroll and is qualified to do so. This Section of the Specifications requires that the following classes of work shall be listed in Paragraph E under the conditions indicated herein.

Classes of Work Reference Specification Paragraphs

N/A

1.03 THE WORK DONE BY THIS SUB-BIDDER IS SHOWN ON THE FOLLOWING DRAWINGS:

1. Lincoln Elementary School: DH1.01 and H1.01.

2. THORNDYKE ROAD ELEMENTARY SCHOOL: H1.01 THROUGH H1.03.

1.04 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein.
   2. Section 26 00 00 - ELECTRICAL

1.05 SUMMARY OF WORK

A. Provide all materials, labor and equipment required to perform the work of this section, as shown on the Contract Drawings and as specified herein, to include the following. When the word "provide" is used in this specification it shall mean to furnish & install. Provide the following:

   1. Demolition of existing HVAC systems at Lincoln Street School and modifications to the existing steam heating system.
   2. Ductless Split Heat Pump System with outdoor heat pump and indoor high wall fan coil unit for the Lincoln Street School and Thorndyke Road School elevator machine rooms.
   3. Refrigerant & condensate drain piping and accessories, including piping enclosure for outside.
   4. Energy Recovery Unit and Electric Duct Heater for the two renovated classrooms at the Lincoln Street School with all ductwork, diffusers and registers.
   5. Louvers for the Lincoln Street School unit.
   6. Ductless Multi-Split HVAC System for the two renovated classrooms at the Lincoln Street School.
   7. Electric Baseboard Heater in Elevator Shaft for the Thorndyke Road School.
   8. Insulation, thermal and/or acoustic, for piping.
   9. Miscellaneous steel, dunnage, supports, hangers, pads, etc., as shown, and as required.
   10. Testing and balancing of ceiling exhaust fans.

1.06 SUBMITTALS

A. Refer to Section 013000, SUBMITTALS for additional submittal provisions and procedures as applicable.

B. Product data: within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit (7) hard copies, or digital copies of the following:

1. Manufacturers catalog cuts, Samples and other items needed to fully demonstrate the quality of the proposed materials and equipment. In addition to the submittals formerly mention herein submit equipment specification sheets and dimensional data on all equipment including but not limited to the following:
   - Ductwork – Hard and Flexible (as applicable).
   - Ductwork Accessories.
   - Registers, Diffusers and Grilles.
   - Ceiling Exhaust Fans.
   - Energy Recovery Unit.
   - Ductless Single Split Heat Pump System including outdoor and indoor units.
   - Ductless Multi-Split Heat Pump System including outdoor and indoor units.
   - Refrigerant and Condensate Drain Piping.
   - Ductwork and Pipe Insulation.
   - Louvers
   - Automatic Temperature Controls

C. Testing and Balancing Reports

1. Submit four (4) copies of a certified testing and balancing report to the Architect for review and approval. Include all air flow readings as outlined herein. (Lincoln Street School).

D. Operating Instructions:

1.06 Prior to the completion of all work and the final inspection of the installation by the owner, three (3) copies of a complete Instruction Manual, bound in booklet form and suitably indexed, shall be submitted to the Architect for review and approval. All written material contained in the manual shall be typewritten or printed.

1.07 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. The Contractor's superintendent shall conduct all coordination between the Contractor, the Architect, the Engineers, etc., and shall fully represent the Contractor's position in his absence. All decisions by the superintendent shall become the responsibility of the Contractor and binding to the Contract. The Contractor shall be responsible for the drawings, and that which is written or implied in the specifications.

C. Without additional cost to the Owner, provide such other labor and materials as are required to complete the work of this Section in accordance with the requirements of governmental agencies

having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.

D. Before submitting the final proposal examine the site of the proposed work to determine existing conditions that may effect the work, as this section will be help responsible for any assumption in regard thereto.

E. All equipment, ductwork, piping and materials utilized for this project must be protected from exposure to weather until installed. Interior equipment and materials shall not be installed unless the area in which they are being installed is adequately weather tight.

1.08 GUARANTEE

A. The Contractor shall guarantee every component part of each system for a minimum of one-year parts and labor. The contractor shall also provide the Owner with factory warranties for all equipment. For equipment with compressors such as the heat pump unit and provide extended five-year warranty on entire sealed system.

PART 2 - PRODUCTS

2.01 DUCTWORK

A. All duct runs shall be checked for clearances before installation of any ductwork. Above hung ceilings, duct locations, and elevations must be coordinated with work of other trades to avoid conflicts with structure, piping, conduit, light fixtures, and cable trays.

B. All sheet metal ducts shall be constructed of galvanized iron sheet of bend forming quality. The following specialty ducts shall be used:

C. Duct construction shall be in accordance with best practices and latest SMACNA requirements for metal gauges, joints, reinforcing, and supports. Ductwork within 20 feet of a VAV system supply and return fan shall be minimum 18 gauge to reduce breakout noise. All ductwork shall be rated for a minimum pressure classification of 3”w.g. upstream of VAV terminals and 2” elsewhere or higher rating as recommended by SMACNA standards. All exposed ductwork shall be constructed and hung to provide a neat, smooth, finished appearance. Cadmium plated sheet metal screws shall be used on all exposed ductwork. Ducts shall be free from expansion or contraction noises or rattling when fans are turned on or off.

D. Round ductwork shall be spiral formed galvanized steel of standard gauge as manufactured by United Sheet Metal, Spiramatic, Semco, or equal.

E. Duct sizes change in shape or dimensions and offset as required to clear structural members and to coordinate with other trades. All changes must maintain the same friction loss as the original duct (i.e. similar free area) and must meet the latest ASHRAE and SMACNA standards.

F. The centerline radius of all duct elbows where shown on Drawings shall be at least one and one-half the width of the duct.

G. Duct sections 1 ft. 6 in. wide or less shall be butted together and jointed with flat drive cleats 2-1/8 in. wide. Top and bottom cleats shall be cut flush with duct and side cleats bent over to make a tight joint. Standing bar slips as specified for ducts over 18 in. may be used at the HVAC Trade contractor's option.

H. Sheet metal screws 3/4 in. No. 10 may be used to attach stiffener angles to ductwork to secure seams, spaced not over 12 in. on centers and not less than two (2) per side of 12 in. or more, except where specified otherwise. Button punching shall not be used, except for pre-erection attachment of fittings.

I. Duct joint sealing, reinforcing, flanges, etc. for square sheet metal ducts shall be based on maintaining airtight ducts at 3 in. w.g maximum static pressure with maximum of 5 percent leakage of total fan capacity, 1/2 of one percent for round and oval ducts. All joints in round and rectangular ductwork shall be sealed with UL classified NFPA approved duct sealer. Off gasing of sealer must comply with LEED requirements for the construction of this building. Seal all ductwork at joists and seams with LEED EQ. Credit compliant water based duct sealer DuctMate® EZ-Seal or approved equal.

J. At branch ducts, provide manually operated dampers of the type and arrangement shown on the Drawings, two gages heavier that the duct in which installed and equipped with locking quadrants. All branch take-offs shall be made with 45° or full Bellmouth type fittings. Spin-in and stick-on take-offs shall not be allowed.

K. Volume dampers, provide single and multi-blade manually adjustable dampers as shown on drawings in all duct splits and branch connection of supply and exhaust air systems.

L. Flexible duct shall be 2.2” thick insulated low-pressure type with foil vapor barrier as manufactured by Automation Industries, Thermaflex type MKE ATCO Greenguard or equal. The minimum installed R-value shall be 6.0 within the heated building envelope and 12.0 outside the buildings heated envelope. The maximum length of flex duct is 5 feet. Secure with tie straps and seal with fiberglass reinforced foil duct tape. Flexible duct shall not be allowed in any exposed areas.

2.02 AIR INLETS/OUTLETS

A. Diffusers, registers and grilles shall be installed where shown on the drawings and shall be of the type, sizes and quantities as indicated on drawings. Manufacturers shall be Price, Titus, Krueger or MetalAire. If entering a return plenum, plenum box shall be lined elbow. For square neck supply diffusers or return grilles connecting to a round duct, the transition piece shall have a minimum 45 deg. angle.

B. All diffusers, registers and grilles shall be constructed out of steel. Final color selection shall be by Architect. Submit color chart for review and selection.

C. Furnish and install steel directional louvered face diffusers of the sizes and mounting types shown on the plans and air distribution schedule. Diffusers shall consist of an outer frame assembly, which facilitates mounting in the application shown. A collar that allows connection to the square (or rectangular) duct size indicated shall be an integral part of the frame assembly. An inner core assembly consisting of fixed louvers capable of producing the air flow discharge pattern indicated on the plans shall be fully removable from the installed diffuser frame for access to any dampers or other ductwork components located in or near the diffuser neck. A set of adjustment vanes shall be provided on each side of the diffuser to allow for field adjustment from horizontal to vertical air flow discharge. Finish shall be B12 white powder coat. Paint finish shall pass 500 hours of salt spray exposure with no measurable creep in accordance with ASTM D1654 and 1000 hours with no rusting or blistering as per ASTM D610 and ASTM D714.

E. Furnish and install transfer, return and/or exhaust registers of the sizes and mounting types indicated on the plans and outlet schedule. Registers shall be 45 degree deflection fixed louver type with blades spaced 3 /4 in. on center. The blades shall run parallel to the (long/short) dimension of the register, as indicated in the outlet schedule. Both blades and border shall be of heavy extruded aluminum construction. The optional integral volume control damper shall be of the opposed blade type and shall be constructed of cold rolled steel. The damper shall be operable from the register face. The optional damper shall be coated steel. The grille shall be finished in B12 White Powder Coat. Paint finish shall pass 500 hours of salt spray exposure with no measurable creep in accordance with ASTM D1654 and 1000 hours with no rusting or blistering as per ASTM D610 and ASTM D714.

2.03 CEILING EXHAUST FANS

A. Exhaust fans shall be of the type and capacity shown on the Drawings; Panasonic, Nutone, Greenheck or equal. Fans shall be tested in accordance with AMCA and bear the AMCA Certified Performance Ratings Seal; fans shall be UL Listed. Provide all with disconnect switches (weatherproof where exposed on roof).

B. Ceiling exhaust fans shall be direct drive centrifugal type. Motor and fan shall be removable from housing; motor shall have ball bearings. Housings shall be steel with acoustic insulation; provide ceiling grille. Provide factory mounted disconnect switch and backdraft dampers. Provide hanging vibration isolators. Provide grille mounted motion sensor with adjustable time delay off and constant on feature.

C. Fans specified have critical sound performance criteria and configuration requirements that must be adhered to. Any equal substitutions must meet or exceed the quality of the specified unit and have sound performance at or below the levels of the specified fans. Fans shall be licensed to bear the AMCA Seal for sound and air performance.

D. Furnish and install Greenheck model #WC-6 hooded wall cap for bathroom exhaust or approved equal by Famco or Broan. Wall cap shall be aluminum construction for outside wall applications with a built-in damper and birdscreen. The G.C. will drill the hole through the building exterior wall and mount outside. The duct connection shall be 6”Ø.

2.04 PIPE & FITTINGS

A. All pipes shall be new, free from scale or rust, of the material and weight specified under the various services. Each length of pipe shall be properly marked at the mill or proper identification with name or symbol of manufacturer.

B. All steel piping, except where otherwise rated, shall be standard or extra strong weight, in conformance with ASTM A-53 Grade A seamless, as manufactured by National Tube Division, Republic Steel Corp., or approved equal.

C. All copper tubing shall be of weight as required for service specified, with conformance with ASTM B-88 for types “L” and “K” tubing, as manufactured by Chase, Anaconda, revere or approved equal. Tubing and fittings shall be thoroughly cleaned with sand cloth and treated with an approved non-corrosive flux before solder is applied.

D. All refrigerant piping, liquid, and suction shall be type "ACR" copper tube, hard drawn, shipped to job site with end caps in place. Fittings shall be refrigerant grade copper fittings. Pipe and fittings shall conform to ANSI B31.5 and ANSI B9.1. Piping shall be complete with all refrigerant specialties, of line size, as indicated on the Drawings, and as required by installation requirements. Joints shall be silver soldered or brazed. Press Fittings for refrigerant piping shall not be allowed.

E. Generally, unless otherwise specified, joints in steel piping 2-1/2” and under shall be screwed, and all sizes 3” and over shall be welded or flanged.

F. Screwed Piping
   1. All connections to apparatus with screwed piping shall be made with 250-pound brass or bronze seat unions.
   2. All screwed nipples shall be scheduled 80 nipples.

G. For copper tubing carrying water, copper press fittings shall be allowed as an alternate to soldered fittings. Acceptable manufacturers shall be Viega or Ridge Tool Co.

   1. Press Fittings: Copper press fittings shall conform to the material and sizing requirements of ASME B16.18 or ASME B16.22. O-rings for copper press fittings shall be EPDM.

   2. Press Connections: Copper press fittings shall be made in accordance with the manufacturers installation instructions. The tubing shall be fully inserted into the fitting and the tubing marked at the shoulder of the fitting. The fitting alignment shall be checked against the mark on the tubing to assure the tubing is fully engaged (inserted) in the fitting. The joints shall be pressed using the tool approved by the manufacturer.

H. Grooved mechanical joint pipe, fittings and couplings shall be allowed as an acceptable substitution for welded pipe fittings except as otherwise not allowed by applicable codes. Product shall be as manufactured by Victaulic Company of America, Grinnell Mechanical Products or approved equal. Fittings shall comply ASTM A106 with grooves or shoulders to accept grooved end couplings. Mechanical couplings shall consist of ductile or malleable iron housing, synthetic rubber gasket of

a central cavity pressure-responsive design, nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.

I. Piping whether indicated or not, shall offset, rise and/or drop to clear lighting fixtures, plumbing, ductwork, structural framing, etc., to maintain desired clearance within spaces.

2.05 PIPE FOR VARIOUS SERVICES

A. Solder for each solder-type fitting shall be of 95% tin and 5% antimony.

B. Pipe Schedule

Service	Piping Type	Piping Sch. WT.	Notes
Refrigerant Piping	ACR hard drawn	ACR type	silver brazed joints *
Condensate Drain Pipe	Type L Copper Tubing		

*Provide liquid line filter drier and sight glass on each circuit. Refrigerant piping installation shall conform to manufacturers recommendations.

2.06 INSULATION

A. General

1. Provide materials complying with NFPA Bulletin 90-A, as determined by UL method 723,NFPA 225-ASTM E 84, and complying with the governing code, with flame spread rating under 25 and smoke developed rating under 50.
2. Insulation properties must meet or exceed the minimum R-values required by the IMC 2012, the applicable Stretch Energy Code adopted by the City/Town as applicable and those indicated herein.
3. Where vapor barriers are used, provide intact and continuous throughout.
4. Minimum post consumer recycled content of 58.5%.
5. Acceptable manufacturers:
   - Owes/Corning Fiberglass
   - Knauf
   - Manville
   - Certainteed

B. Supply, Return & Relief Air Ductwork

1. The following ductwork shall be insulated:
   - All supply air, return air and mixed air ductwork shall be insulated. Supply and mixed air ductwork located within a return air ceiling plenum must be insulated and are not exempt from insulation. Return air ductwork located within a ceiling cavity within the building thermal envelope, where a conditioned area matching the air

conditions of the conveying duct is located above and below this ceiling cavity need not be insulated.

- Relief and exhaust air ductwork from the discharge point to the backdraft or isolation damper (see outdoor air ductwork).
- All supply air duct and exhaust air ductwork connecting to an energy recovery unit. This includes recovery unit exhaust air ductwork from the unit to the building envelope discharge point.

2. Above ductwork shall be insulated with 2 inch thick flexible blanket duct insulation with vapor barrier, 1.0 lbs. per cu. ft. density glass fiber with maximum K factor of 0.25 at 75 degree F. mean temperature with fire retardant foil/Kraft (FSK) vapor barrier facing. Product shall be Owens Corning SOFTR™ Type 100 or equal with an installed R-value of 6.0 or greater. All seams and joints shall be taped with matching fiberglass reinforced foil vapor barrier tape. Exposed supply and return ductwork located within the conditioned it serves need not be insulated. Duct indicated as being internally lined need not be externally insulated except when located on the roof or within an unconditioned space.

C. Outdoor Air Ductwork

1. All outdoor air ductwork including combustion air ductwork and outdoor and relief/exhaust air louver plenums shall be insulated with 3 inch thick flexible blanket duct insulation with vapor barrier, 1.5 lbs. per ft. density glass fiber with maximum K factor of 0.24 at 75 degree F mean temperature with fire retardant foil/Kraft (FSK) vapor barrier facing. Ductwork within mechanical rooms shall be rigid type insulation. Product shall be Owens Corning SOFTR™ Type 150 or equal. All seams and joints shall be taped with matching kraft paper vapor barrier tape. Minimum installed R-value shall be 12.

D. Piping Insulation

1. Insulate Refrigerant suction lines with 1” thick wall closed-cell Armorcell insulation with all joints and seams glued vapor tight. For refrigerant piping exposed to the exterior weather provide 2 coats of U.V. resistant paint as provided by the insulation manufacturer over insulation. Interior condensate drain lines shall be insulated as indicated for refrigerant suction lines with ½” thick insulation.

2. Provide Zeston fittings at all elbows and fittings. Seal all seams and fittings vapor tight so as to minimize condensation potential.

3. Provide covering on all exterior insulated piping and equipment. Product shall be field-applied or pre-applied protective finishing and/or vapor sealing, operating within the range of -94°F (-70°C) and 300°F (149°C), jacketed with laminated, flexible, self-adhering, protective jacketing, vapor barrier and weather proofing membrane, having a high performance acrylic adhesive capable of installation with no additional mechanical attachment. Material is to be VentureClad 1577CW (5ply) Natural, White (White Membrane “WM”), or approved equal finish selected based on availability and desired final appearance of insulated system. Jacketing material is to have a maximum flame spread/smoke developed index of 10/20 per UL 723 test, a .000 water vapor permeance rating per ASTM E-96, and mold inhibitors incorporated. All products are UV stable.

Fabrication and installation shall conform to the manufacturer's installation instructions and Midwest Insulation Contractors Association National Insulation Standards

2.07 PIPE HANGERS AND SUPPORTS

A. Provide necessary structural members, hangers, and supports of approved design to keep piping in proper alignment and prevent transmission of injurious thrusts and vibrations. All hangers and supports shall be capable of screw adjustment after piping is erected. Hangers in contact with copper or brass pipe shall be copper plated steel.

B. Pipe hangers shall be the clevis type, except where otherwise noted.

C. Spacing of pipe hangers shall not exceed four (4) feet.

2.08 DUCTLESS SINGLE SPLIT HEAT PUMP SYSTEM

A. Furnish and install a ductless split commercial wall hung fan coil as scheduled matched with a roof mounted air cooled heat pump unit. Indoor unit shall be wall hung as scheduled. The matched system shall be rated per ARI Standard 210/240 and certified by UL and CSA. The system shall be as manufactured by Daikin, Mitsubishi, Sanyo or equal. A non-CFC or HCFC refrigerant must be used such as R-410A or approved equal. Minimum SEER2=18.

B. The combination of the outdoor unit and the indoor-fan coil unit shall have a total net cooling capacity as scheduled on drawings or greater at conditions of entering-air temperature at the evaporator coil of 80 degrees F. dry bulb and 67 degrees F. wet bulb. Outdoor ambient temperature of air entering the condenser of 95 degrees F. The system shall have a minimum listed SEER (seasonal energy efficiency ratio) of 15 at ARI conditions.

C. Indoor Fan Coil Unit:

1. Indoor, direct-expansion, wall hung fan coil unit. Unit shall come complete with cooling coil, fan, fan motor, piping connectors, electrical controls, condensate pump, and hanging brackets.

2. Cabinet shall be constructed of zinc-coated steel. Fully insulated discharge and inlet grilles shall be attractively styled, high-impact polystryrene. Cabinet shall have filter tracks and cleanable filters which shall be accessible from below with a 1/4-turn fastener. Adjacent room cooling to be provided by a simple knockout in the cabinet side panel, and cabinet shall have provisions to accommodate a limited amount of ductwork, if desired.

3. Fan shall be a centrifugal, direct-drive blower type with air intake in center of the unit and discharge on the perimeter. Air louvers shall be adjustable.

4. Coil shall be copper tube with aluminum fins and galvanized steel tube sheets. Fins will be bonded to the tubes by mechanical expansion. A drip pan under the coil shall have a factory-installed condensate pump and drain connection for hose attachment to remove condensate. External pump shall be provided for wall units as required.

5. Motor shall be totally enclosed and permanently lubricated with inherent protection. Fan motor shall be 3-speed. Unit shall operate on single phase 60- cycle 208 V power.

6. Controls shall be 24 Volt, and shall be easily operated by the user from a wall-mounted control unit. Float control shall be in the condensate sump to shut unit down in case of pump malfunction. A wall-mounted programmable thermostat with three (3) fan speed selections, and an auto/manual switch shall be supplied for field installation. The refrigerant is controlled with a piston-type refrigerant metering device, and evaporator coil freeze protection shall be provided.

D. Outdoor Air Cooled Heat Pump Unit: Furnish and install matching heat pump unit. Heat pump unit shall have low ambient control for operation down to 0°F, hard start assist kit, winter start package and crankcase heater.

E. Heat Pump Unit Stand: Provide wall mounted heat pump unit snow stand similar to Quick-Sling Mini-Split Stand product or equal securely fastened to the anchored wall and the unit. Provide neoprene seismic rated vibration isolators.

2.09 DUCTLESS MULTI-SPLIT HEAT PUMP SYSTEM (LINCOLN STREET SCHOOL)

A. Furnish and install where shown on the plans an electric air cooled heat pump unit as scheduled on the drawings by Daikin, Carrier or approved equal by Mitsubishi, Hitachi or EMI . U.L. or E.T.L. listed. The system shall have a minimum listed SEER (seasonal energy efficiency ratio) of 13 at ARI conditions. Refrigerant must be R-410A or other non CFC non HCFC refrigerant.

B. Condenser coils shall be constructed of copper tube and hardened black coated aluminum fins. The fins shall be protected with a grille. The compressor shall be internally protected against high pressure and temperature using a high pressure relief valve and a temperature sensor. The cabinet shall be of pre-painted galvanized steel. The motor bearings shall be permanently lubricated. The refrigerant connections shall be fully exposed and there shall be a single panel covering the electrical controls.

C. Standard Features:

1. Hermetically sealed scroll compressor with internal high-pressure relief.
2. Fully charged for up to 15 feet of tubing length with Puron refrigerant 410A.
3. Louvered guard protects coil from damage and adds strength to unit.
4. Bottom pan rails elevate unit above slab.
5. Quiet operating top discharge.

6. Totally enclosed and permanently lubricated condenser motor.
7. Copper tube/aluminum fin coil.
8. Brass suction and liquid service valve with sweat connections.
9. Contactor with lug connections.
10. Ground lug connection.

D. Cabinet Construction:

1. Polyester powder paint provides premium durability and improved UV protection.
2. Heavy-gauge, zinc-clad, G90 galvanized steel.

E. Options:

1. Low ambient control down to 32°F outdoor ambient.
2. Hard start assist kit.

2.10 ENERGY RECOVERY UNIT (LINCOLN STREET SCHOOL)

A. SYSTEM DESCRIPTION

1. The ventilation equipment shall be Energy Recovery Ventilator (s) (ERV) as manufactured by Daiken, RenewAire, Greenheck or approved equal. Equivalent manufacturers must physical fit within the confines of the specified unit to be allowed as an equal

2. Energy Recovery Ventilator (ERV) shall be a packaged unit as manufactured by Greenheck, Daikin or RenewAire and shall transfer both heat and humidity using static plate core technology or a rotating total energy recovery wheel.

B. QUALITY ASSURANCE

1. The energy recovery cores used in these products shall be third party Certified by AHRI under its Standard 1060 for Energy Recovery Ventilators. AHRI published certifications shall confirm manufacture’s published performance for airflow, static pressure, temperature and total effectiveness, purge air (OACF) and exhaust air leakage (EATR). Products that are not currently AHRI Certified will not be accepted.

2. Manufacturer shall be able to provide evidence of independent testing of the core by Underwriters Laboratory (UL), verifying a maximum flame spread index (FSI) of 25 and a maximum smoke developed index (SDI) of 50 thereby meeting NFPA 90A and NFPA 90B requirements for materials in a compartment handling air intended for circulation through a duct system. The method of test shall be UL Standard 723.

3. Unit shall be Listed under UL 1812 Standard for Ducted Air to Air Heat Exchangers. Some exceptions to UL Listing may apply. Units intended for “Outdoor Use” shall be listed using the specific UL requirements for rain penetration, corrosion protection and seal durability and shall be so labeled.

4. The ERV core or wheel shall be warranted to be free of manufacturing defects and to retain its functional characteristics, under circumstances of normal use, for a period of ten years from the date of purchase. The balance-of-unit shall be warranted to be free of manufacturing defects and to retain its functional characteristics, under circumstances of normal use, for a period of two years from the date of purchase.

C. INSTALLATION

1. The installation of all ERV units, duct work, all interconnecting control and power wiring, commissioning and testing shall be carried out by licensed installers in accord with all Codes and requirements.

D. DELIVERY, STORAGE AND HANDLING

1. Unit shall be stored and handled according to the manufacturer's recommendations.

2. The unit will be able to withstand 105°F storage temperatures and 95% relative humidity without adverse effect.

E. WARRANTY

1. The ERV units shall have a manufacturer's parts and defects warranty for a period one (1) year from date of installation If, during this period, any part should fail to function properly due to defects in workmanship or material, it shall be replaced or repaired at the discretion of the manufacturer. This warranty does not include labor.

2. The Energy Transfer Core shall have an additional nine (9) year warranty against defects in material or workmanship. The total warranty period shall be ten (10) years from date of installation.

F. PRODUCTS

1. The energy recovery component shall be of fixed-plate cross-flow construction, with no moving parts.

2. No condensate drain pans or drains shall be allowed and unit shall be capable of operating in both winter and summer conditions without generating condensate.

3. The unit case shall be constructed of G90 galvanized, 20-gauge steel, with lapped corners and zinc plated screw fasteners. The unit roof shall be one piece or have watertight standing seam joints and shall overlap wall panels and doors in order to positively shed water.

4. Access doors shall provide easy access to blowers, ERV cores/wheels and filters. Doors shall have an airtight compression seal using closed cell foam gaskets rated for outdoor exposure. Pressure taps, with captive plugs, shall be provided allowing cross-core pressure measurement allowing for accurate airflow measurement.

5. Case walls and doors shall be insulated with 1 inch, 4 pound density, foil/scrim faced, high-density fiberglass board insulation, providing a cleanable surface and eliminating the possibility of exposing the fresh air to glass fibers, and with minimum R-value of 4.3 (hr·ft2·°F/BTU).

6. The ERV cores shall be protected by a MERV-8 rated, 2" nominal, pleated, disposable filter in both airstreams. Provide four (4) spare sets.

7. Unit shall have single-point power connection and a single-point 24 VAC contactor control connection .

8. Blower motors shall be Premium Efficiency ECM or equal, EISA compliant for energy efficiency. The blower motors shall be totally enclosed (TEFC) and shall be supplied with factory installed motor starters. Direct drive models shall be EISA compliant for energy efficiency with open drip proof design and integral thermal protection. Unit shall be equipped with ECM motors for variable speed balancing and remote control via the EMS.

9. Blowers shall be quiet running, forward curve type and be either direct drive or belt drive. Belt drive motors shall be provided with adjustable pulleys and motor mounts allowing for blower speed adjustment, proper motor shaft orientation and proper belt tensioning.

10. The unit electrical box shall include a factory installed, non-fused disconnect switch and a 24 VAC, Class II transformer/relay package.

G. ACCESSORIES and OPTIONS

1. The ERV shall be provided with ECM motors.

2. Provide unit and duct connection orientation per project schedule.

3. Provide double wall construction with 24-gauge galvanized steel liner. Provide exterior rated unit with baked epoxy finish and pitched roof panels for drainage.

4. Units are available single or three phase at a full range of operating voltages. See project schedule.

5. Provide motor horsepower as specified in project schedule. Motors shall be premium efficiency inverter rated. Provide variable frequency drives for balancing and control via EMS.

6. Provide factory installed disconnect fuses.

7. Provide factory installed Variable Frequency Drives (in models where ECM motors are not available) allowing either preset or variable speed operation with appropriate 0-10 volt DC or DDC control signal.

8. Provide factory installed isolation dampers for both air streams. The insulated dampers shall be of a low leakage design and shall not restrict the airstream, reducing airflow, in any way. The dampers shall be opened with a motor actuator powered by the standard unit transformer package and have a spring return for low off-position power consumption.

9. Provide factory installed filter monitors for each airstream.

10. Although defrost mode is not anticipated, units shall have the ability to cycle an Exhaust Only defrost mode when enabled units unitary control.

11. Provide MERV-8 filters for final installation after construction phase. Provide four (4) spare filter sets.

2.11 ELECTRIC DUCT HEATER (LINCOLN STREET SCHOOL)

A. General: Electric duct heaters be as provided by QMark®, A Marley Engineered Products Brand. Voltage, size, KW, steps and control voltage shall be as scheduled. Three phase heaters shall have balanced phases.

1. Heaters shall be CSA and UL Listed for zero clearance and shall meet all NEC requirements, unless otherwise specified.
2. Type: Heaters shall be of the following configuration:
   For Duct Mounting . . . . . All Slip-in or Flanged
   For Air Handling Unit Coils . . . . . All Slip-in or Flanged
3. Open coil heating elements shall be 80% nickel and 20% chromium; steps shall be arranged to prevent stratification when operating at less than full capacity. Elements for draw-through air handling units shall be de-rated to 35 watts per square inch; blow-through air handling coils and variable volume reheat coils shall be de-rated to 25 watts per square inch.
4. Element terminals shall be stainless steel; insulators and bracket bushings shall be nonporous ceramic and securely positioned. Terminals shall be machine crimped to elements.
5. Frame shall be constructed of heavy gauge galvanized steel with galvanized steel brackets, stiffening ribs and gussets spot welded to the frame. Stainless and Aluminized steel frames are available.
6. Terminal box shall be spot welded construction with solid, hinged cover, totally enclosed, without louvers or grilles per the CSA and UL Standard, unless otherwise specified.
7. Recessed terminal box to be provided when coils are installed in ducts with internal insulation or obstruction greater than 1”.
8. Direction of airflow: heaters shall be interchangeable for horizontal left or right or vertical up airflow except when position sensitive mercury contactors or SCRs are built-in. In these cases, airflow direction shall be as scheduled.
9. Safety devices: a disc-type automatic reset thermal cutout shall be furnished for primary over temperature protection. For secondary protection, a sufficient number of replaceable thermal cutouts in the power lines shall de-energize elements if the primary cutout fails.

All safety devices shall be serviceable through the terminal box without removing the heater from the duct.

10. Wiring diagrams: a unique wiring diagram shall be furnished for each heater. Diagram shall include recommended supply wire gauges per NEC and fuse sizes.
11. Built-in components shall include safety interlocking disconnect switch, disconnecting break magnetic contactors, transformer with primary fusing per CSA and UL, pressure-type airflow switch set at .05" WC, supplementary circuit fuses per NEC (one set of fuses per 48 amp circuit), and separate load and control terminal blocks to accept conductors as shown on the electrical plan.
12. Special features: the following special features are available:

SPECIAL CONSTRUCTION
- Insulated Terminal Box
- Dust tight Terminal Box
- Weather Resistant Terminal Box (non-removable flange)
- Recessed Terminal Box
- Bottom Insert - open coil only
- Round-duct Construction
- Stainless Steel Frame
- Aluminized Steel Frame
- Hinged Terminal Box Cover
- High Pressure Construction
- Protective Screens
    a . Inlet Side Only
    b . Outlet Side Only
    c . Both Sides

OVER-CURRENT PROTECTION
- Automatic Circuit Breakers (in lieu of fuses)
- Fuses Per Step (in lieu of one per 48 amperes)
- Main Supply Over-current Protection (heaters 48 amperes or less)

OVER-TEMPERATURE PROTECTION
- Manual Reset Thermal Cutout in control circuit in series with automatic
- Manual Reset Thermal Cutout in power lines (in lieu of secondary cutouts)
- Manual Reset Thermal Cutout operating back-up contactors
- Automatic Reset Thermal Cutout

SWITCHING DEVICES AND CONTROLS
- Magnetic Contactors, De-energizing (in lieu of disconnecting)
- SCRs (solid state modulating control)
- Toggle Switch(es)
    a . One Per Step
    b . Interrupts Control Voltage
    c . NEMA 12
- Door Interlock Switch (to break control circuit)
- Step Controller(s) (specify input)
    a . Electronic Modulating
- Time Delay Relay
- PE Switch(es) (for pneumatic control; specify close or open on pressure rise)
- Transducer (pneumatic to 135 Ohm)

- Pilot Light(s)
  a . One Per Step (x # of steps)
  b . Control Voltage On
  c . Power On (Line Volts)
  d . Normal Operation (Automatic Reset Circuit is Closed)
  e . Airflow Switch Open
  f . Manual Reset Thermal Cutout On
  g . Push-To-Test Type (Not CSA and UL except with 16E)
  h . Over-temperature (Automatic Reset Cutout Circuit is Open)
  i . Nema - 12 (non-CSA and UL) or Nema - 4 (non-CSA and UL)
  j. Heater On

13. Manufacturer to provide two year limited warranty.

2.12 LOUVERS (LINCOLN STREET SCHOOL)

A. Louvers meeting the following specifications shall be furnished and installed where shown on the plans. Louvers shall be stationary type with drainable blades in a 4" louver frame. Each stationary blade shall incorporate an integral drain gutter and each jamb shall incorporate an integral downspout so water drains to blade end, then down the downspouts and out at the louver sill rather than cascading from blade to blade.

B. Each factory-assembled louver section shall be designed to withstand wind loadings of 25 pounds per square foot (100 mph wind equivalent). Louver frames, mullions, and section joints shall be adequately supported from the building structure to withstand this same wind loading.

C. Louver performance data shall be licensed under the AMCA Certified Ratings Program and shall bear the AMCA Certified Ratings Seal. This certified performance data shall include airflow pressure loss and water penetration, and shall demonstrate performance equal to or better than the Greenheck model specified.

D. Louvers shall be Greenheck model #ESD-403 drainable type fabricated from 60637T5 aluminum extrusions of 0.081" nominal wall thickness. Blades shall be positioned at 37° and 45°angles approximately on 4" centers. Each louver shall be equipped with a framed, removable, rear-mounted screen of ¾" x 0.051" expanded flattened aluminum.

E. Louver shall be supplied with a Kynar finish applied following a thorough cleaning and pretreatment of the metal surface. Dry film thickness of the Kynar shall be approximately 1.2 mils after baking at 450°F. Color shall be by the architect and shall be selected from the standard color chart, which shall be submitted with the louvers.

2.13 ELECTRIC BASEBOARD HEATER (THORNDYKE ROAD SCHOOL)

A. Electric baseboard heater shall be factory assembled for surface mount field installation. Commercial-grade 20-gauge cold rolled front cover and brackets allow heater to withstand rigors of commercial applications. Steel-sheathed heating element combines the durability of a steel tubular heater with aluminum fins. Built-ion wired-way facilitates end-to-end installation of continuous-run heaters. Pre-wired junction boxes at each end are provided with knockouts. There

is a high temperature safety limit. UL-listed for installation flush to any wall and flat on any floor type. There are no fans.

2.14 ELECTRICAL WORK

A. The Heating, Ventilating and Air Conditioning Contractor shall provide all wiring for the Automatic Temperature Controls for all HVAC systems except as otherwise specified herein.

B. The HVAC contractor shall hire a licensed electrician to perform all control wiring as required by code. Minimum gauge of all control wiring is 18 AWG.

C. For all low voltage motors, temperature control wiring and motor control wiring, including wiring for interlocking, shall be provided by the Section providing the motors, including the installation of all control devices.

2.15 AUTOMATIC TEMPERATURE CONTROLS

A. Furnish and install all control components necessary to obtain a fully functional control system for the systems as described herein. Contractor shall review the drawings, Sequence of Operations, the itemized controls listed below and the entire Division 15600 specification for additional control information. The contractor is responsible for providing all transformers, controls, relays, etc.. necessary to accomplish the Sequence of Operations and performance specified, whether or not the items are specifically identified herein. Final location of all starters, controls, thermostats and sensors shall be coordinated with the Engineer and Owner.

B. The HVAC contractor shall coordinate with the electrical contractor and pay for all electrical power service required to supply the required power voltage to the control systems if not shown on the electrical drawings. All low voltage control wiring shall be a minimum of 18 AWG plenum rated. All wiring shall run concealed within walls and ceilings. If wiring must run exposed it must be installed in Wiremold® product in finished public areas or, in non-public areas in EMT conduit. Exposed conduit shall be painted to match the surface it is attached to.

C. SEQUENCE OF OPERATION DUCTLESS SINGLE SPLIT HEAT PUMP (LINCOLN STREET AND THORNDYKE ROAD SCHOOLS):

1. The thermostat, upon sensing a change in space temperature from cooling setpoint shall stage the FC fan and respective heat pump unit as required to maintain setpoint. Initially setpoint shall be 90°F. Note that typically the heat will not enable in an elevator machine room.

D. SEQUENCE OF OPERATION DUCTLESS MULTI-SPLIT HEAT PUMP (LINCOLN STREET SCHOOL):

1.06.1 The thermostat, upon sensing a change in space temperature from cooling setpoint shall stage the FC fan and respective heat pump unit as required to maintain setpoint. Initially

setpoints shall be 74°F occupied & 62°F unoccupied for heating and 75°F occupied and 88°F unoccupied for cooling.

1.07 If a fan coil unit with integral condensate drain pump detects an overflow condition in the condensate pump well, the fan coil cooling cycle shall be disabled and an alarm shall be reported to the front-end.

E. SEQUENCE OF OPERATION ENERGY RECOVERY UNIT AND ELECTRIC DUCT HEATER (LINCOLN ST SCHOOL):

1.07.1.1 General

a. ERV-1 is a constant volume energy recovery units which provides year-round ventilation to the fan coil systems serving the two lower level classrooms at the Lincoln Street Schhol. The unit comes with some integral factory controls as well however, full interface and control as specified herein is the responsibility of the mechanical and controls contractor.

2. Supply and Exhaust Fan Control

a. The EMS shall index from the occupied mode to the unoccupied mode based on a time schedule furnished by the owner. This schedule may be temporary overridden for a predetermined time period by push button override switches on the space thermostats. When overridden, the system will run in occupied mode for a 2-hour (adj.) time period. Enable/disable control and status of fans shall be reported by the EMS.

3. Occupied Mode

a. The outdoor air and exhaust air dampers shall open when the FC systems served by the unit enter the occupied mode as determined by system schedule or occupied override switch.

b. Supply and exhaust fans shall run continuous during occupied periods.

c. The electric duct heater shall stage as required to maintain the supply air temperature at a setpoint reset between 55°F and 65°F based on average space temperature. Supply air shall be at its minimum of 55F when the average space temperatures are at or above 75°F and 65°F when the average space temperatures are at or below 70°F

d. If discharge air temperature (upstream of electric duct heater) or supply air temperature (downstream of the electric duct heater) falls below 45°F for longer than 60 seconds the ERV unit shall be disabled, dampers shall close and a freeze warning shall be reported by the EMS.

e. If freeze stat located downstream of the electric duct heater falls below 38°F for longer than 30 seconds the ERV unit shall be disabled, the electric duct heater shall be disabled and the dampers shall close. A freeze alarm shall be reported by the EMS.

f. Unit shall cycle exhaust only defrost control based on a factory provided defrost sequence. In general, defrost should not need to occur until OA temperatures are below 5°F.

4. Unoccupied Mode

a. If the system goes into an unoccupied mode the ERV shall be disabled and its respective outdoor air damper shall close.

F. SEQUENCE OF OPERATION CEILING EXHAUST FANS (LINCOLN ST SCHOOL):

1.07.1.1.1 Bathroom exhaust fan shall be controlled by a grille mounted motion detector. Electrical contractor shall be responsible for wiring the fan to line-voltage power supply. The bathroom fan shall operate continuously at low speed. If someone enters the bathroom, fan shall operate at high speed. The fan shall have a built-in time delay switch that can be set to allow the fan to continue to operate after the bathroom occupant has left the room. The fan shall run for a minimum of 15 minutes and a maximum of 30 minute after the person exits the bathroom.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of heating, ventilating and air conditioning system will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Install equipment ductwork, piping and controls where shown with recognized industry standards and practices, to ensure that installation complies with requirements and serves intended purposes.

B. Coordinate with other work as necessary to interface installation of ductwork, piping and equipment with other components of systems.

C. Installation of Ductwork:

1. Installation of ductwork shall be coordinated with other work as necessary to interface installation or ductwork with other components of systems. Duct sizes shown on the drawings at connection to fans or other equipment may vary in actual installation.

Contractor shall provide transition pieces as required. Ducts, casings and hangers shall be installed straight and level and shall be free of vibration and noise when fans are operating.

2. Provide safing to close all floor and wall (where fire rated) openings around ductwork - pack annular space with rockwool and 18 gauge sheet metal safing.

3. Seal the ductwork at joists with suitable sealers 3M EC-800 or approved equal.

D. Installation of Piping:

1. Contractor shall examine location where the piping is to be installed and determine space conditions. Provide and erect in a workmanlike manner, according to the best practices of the trade, all piping shown on the Drawings or required to complete the installation intended by these Specifications.

2. All drain piping from condensate drain pans shall be properly trapped in accordance with the static pressures involved. Condensate drain piping sizes shall be not less than 3/4 inch.

3. This contractor is responsible for coring of all holes related to his/her work in coordination with the general contractor and with prior consent of the Architect.

4. Provide fire safing to seal all floor and wall (where fire rated) openings around piping.

E. Installation of Equipment:

1. Contractor shall examine location where equipment is to be installed and determine space conditions and notify Architect, in writing, of conditions detrimental to proper and timely completion of work.

2. Install equipment where shown in accordance with manufacturer's written instructions.

3.03 FIELD QUALITY CONTROL

A. Upon completion of installation of the automatic temperature control system and after motors have been energized with normal power source, test system to demonstrate compliance with requirements. When possible, field correct malfunctioning controls then retest to demonstrate compliance. Replace controls which cannot be satisfactorily corrected. Refer to Section - Test and Balancing.

3.04 SERVICE

A. After completion of the control system installation, the controls contractor shall regulate and adjust all thermostats, control valves, damper motors, etc., and place in complete operating condition, subject to the approval of the Owner. Complete instructions shall be given to the

operating personnel. There shall be one day of instruction given on the operation of the entire system.

3.05 TESTING, ADJUSTING AND BALANCING

A. All equipment shall be tested. Test shall be performed in the presence of and to the satisfaction of the Owner and such other parties as may have legal jurisdiction.

B. In no case shall equipment or accessories be subjected to pressure exceeding their ratings.

C. All defective work shall be promptly repaired or replaced and the tests shall be repeated until the particular system and component parts thereof receive the approval of the Architect.

3.06 LABELING

A. All equipment & starters shall be labeled with engraved laminated nametags.

END OF SECTION

SECTION 26 00 00
ELECTRICAL
(Filed Sub-Bid requirement)

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.01 FILED SUB-BID REQUIREMENTS

A. The work of this section shall be included as sub-sub work of section 26 00 00 - electrical, stipulated as a filed sub-bid under paragraph d, item 2 of the form for general bid.

B. The sub-bidder of section 26 00 00 - electrical shall examine all drawings and all sections for requirements affecting the work of this section as shown primarily in the following drawings: d1.01 through a13.01 inclusive.

C. The sub-bidder of section 26 00 00 - electrical shall examine all other drawings and all other sections for requirements that could affect the work of this section as it relates to coordination. The other drawings are the following: ex-1 through c-03 inclusive; l1.0 through l2.0 inclusive; s0.01 through s3.01 inclusive; fp1.1 through fp1.2 inclusive; p1.0 through p2.1 inclusive; h1.1 through h3.3 inclusive, ed1.1 through fa.2a inclusive; fs.01; t1.01 through t2.03 inclusive.

1.02 RELATED DOCUMENTS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01- General Requirements, apply to the Work of this Section.

1.03 DESCRIPTION OF WORK

A. The Work of this Section is for Lincoln, Thorndyke and Gerard Creamer Schools and shall include, but is not limited to, furnishing and installation of the following:

1. Lighting and associated controls, power and fire alarm.

PART 1 - GENERAL
1.01 FILED SUB-BID REQUIREMENT
1.02 RELATED DOCUMENTS
1.03 DESCRIPTION OF WORK
1.04 RELATED WORK SPECIFIED ELSEWHERE
1.05 GENERAL PROVISIONS
1.06 EXAMINATION OF SITE

1.07 DRAWINGS AND SPECIFICATIONS
1.08 INSURANCE
1.09 CHANGES AND REVISIONS
1.10 WORKMANSHIP
1.11 MANUFACTURERS' NAMES AND TRADE NAMES
1.12 MATERIAL STORAGE AND OFFICE SPACE
1.13 GUARANTEE
1.14 RELATED WORK
1.15 CUTTING AND CORING
1.16 SCAFFOLDING AND EQUIPMENT
1.17 PRE-INSTALLATION MEETING
1.18 OPERATING INSTRUCTIONS
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1.20 RECORD DRAWINGS
1.21 TEMPORARY LIGHT AND POWER
1.22 DEFINITIONS
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PART 2 - PRODUCTS
2.01 RACEWAYS AND FITTINGS
2.02 FIREPROOFING AND CONDUIT SEAL
2.03 WIRING SYSTEM
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2.05 GROUNDING
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2.11 POWER WIRING
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2.13 SAFETY DISCONNECT SWITCHES
2.14 CIRCUIT BREAKERS
2.15 PANELS
2.16 LOW VOLTAGE DISTRIBUTION BOARD
2.17 TRANSIENT VOLTAGE SURGE SUPPRESSOR INTEGRAL DEVICE (TVSS)
2.18 SHORT CIRCUIT AND PROTECTION COORDINATION STUDY
2.19 FIRE ALARM SYSTEM

PART 3 – EXECUTION
3.01 INSPECTION AND COORDINATION
3.02 INSTALLATION
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3.04 WIRING
3.05 WIRE

3.06 GROUNDING SYSTEM
3.07 OUTLET BOXES
3.08 PULL AND JUNCTION BOXES
3.09 WIRING DEVICES
3.10 EXIT LIGHTS
3.11 FIRE ALARM SYSTEM
3.12 INSTRUCTIONS TO OWNER
3.13 CLEANUP
3.14 FIRESTOPPING
3.15 RUBBISH REMOVAL

1.04 RELATED WORK SPECIFIED ELSEWHERE

A. The Trade Contractor of this Section shall carefully examine all other Drawings and all other Sections of the Specification for requirements that may affect the Work of this Section. The following listed Sections:
1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
2. Section 02 41 13 – Selective Demolition
3. Section 23 00 00 – HVAC

1.05 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION -01 – GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.06 EXAMINATION OF SITE

A. Before submitting a Bid, this Contractor must visit the job site to determine the conditions under which the work is to be done.

1.07 DRAWINGS AND SPECIFICATIONS

A. Drawings and specifications are complementary to each other. Any labor and material which is called for by either, whether or not by both, or which is necessary for the successful operation of all systems, shall be furnished and installed. Discrepancies should be brought immediately to the attention of the Architect. It shall be the responsibility of this contractor to review all trades plans for all scale requirements, electrical requirements and proposed equipment locations.

B. Plans and specifications for this project should be examined to determine the scope and character of the work, the building design and function, and the required coordination with the General Contractor and other Trades before and during construction.

C. Any questions regarding the plans and specifications shall be addressed in writing to the Architect five (5) days before Bids close; otherwise, after the closing of the Bids, the Architect's interpretation of the meaning and intent of the plans and specifications shall be final.

D. Shop drawings and submissions of materials shall be made within thirty (30) days after the signing of the Contract; refer to the General Conditions Section to obtain the information pertaining to shop drawing submission requirements.

E. This Contractor shall prepare an electrical set of coordination drawings to overlay with all other Trades. Drawings shall be prepared on translucent drawings to properly coordinate all of the other equipment to be installed. Prior to any installations, the Electrical Contractor must receive approval of drawings from the Architect.

1.08 INSURANCE

A. Insurance is to conform to the provisions and requirements as set forth in Division 1.

1.09 CHANGES AND REVISIONS

A. Costs for changes and/or revisions shall be submitted to the General Contractor with material and labor breakdown of charges and credits clearly itemized.

B. Work shall not be executed until approval has been received in writing from the Architect.

1.10 WORKMANSHIP

A. Materials shall be new and shall conform to the standards of UL, Inc., in every case where such a standard has been established for the particular type of material in question. Work shall be executed in a workmanlike manner and a competent Foreman shall be provided for the entire project.

B. After wires are pulled in and fixtures and equipment are installed, this Contractor shall make tests for performance, grounds, etc., and shall immediately remedy any defects. Equipment for tests shall be provided by this Contractor.

C. Work under this Contract must be so performed that the progress of the entire project, including work of all Trades, shall not cause delays or interference. Materials and apparatus shall be installed as fast as the condition of the building will permit.

D. It will be the responsibility of the Electrical Foreman to instruct the Owner in the function, operation and maintenance of electrical systems and equipment. This is to be done upon completion of the installation, before leaving the job site and to the satisfaction of the Owner, Engineer, and Architect.

1.11 MANUFACTURERS' NAMES AND TRADE NAMES

A. Throughout the specification types of materials may be specified by manufacturer's name and catalogue number in order to establish standards of performance and quality, and not to limit competition.

1.12 MATERIAL STORAGE AND OFFICE SPACE

A. This Contractor shall maintain at his own expense, where directed on the premises, neat, covered storage for material and equipment, and office space where drawings and specifications shall be kept for records.

B. Equipment or material damaged during the construction period shall be replaced at this Contractor's expense.

1.13 GUARANTEE

A. Materials and labor incorporated in the work are to be guaranteed against defects for a period of one (1) year from date of substantial completion. This Contractor shall correct such defects that occur within the guarantee period and to the satisfaction of the Architect without cost to the Owner, within a twenty-four (24) hour period.

B. This Contractor shall not be responsible for failures through normal usage, nor for those caused by neglect or abuse on the part of the Owner or his employees.

1.14 RELATED WORK

A. Following related work is not included in this Section and will be performed under designated Sections.
1. Motorized equipment will be furnished complete with motors under other Sections. Control wiring for these motors shall be the responsibilities of others. See HVAC, Plumbing, and Fire Protection Sections.
2. Major cutting – up to and including 51/2" and patching.
3. Starters and controls are furnished under Plumbing Section and HVAC Section. The Electrical Contractor shall be responsible to install and wire all starters.
4. Filling of space around conduits which penetrate floor slab: to be fire stopped by Electrical Sub-Contractor.
5. Fire stopping of all penetrations in rated walls and ceilings: see FIRESTOPPING Section for acceptable material to be used on the exterior of the sleeve and around wires to be used by this Contractor. The Electrical Contractor shall be responsible for all firestopping of the interior and exterior of raceways installed through walls and floors.

1.15 CUTTING & CORING

A. The installation of new Work that requires cutting and coring of floors, walls, and roofs with dimensions 5-1/2 in. or less shall be performed by the Subcontractor of this Section. The General Contractor shall cut and core floors, walls, and roofs with dimensions not indicated by the Subcontractor of this Section.

1.16 SCAFFOLDING AND EQUIPMENT

A. The Subcontractor of this Section shall provide, maintain, and safely remove when no longer required, interior and exterior staging, scaffolding, hoists, and all other related equipment to

comply with all applicable Federal, State, and local regulations and codes.

1.17 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, determine acceptable mock-ups, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Owner's Project Manager, Architect, and Subcontractors.

1.18 OPERATING INSTRUCTIONS

A. This Contractor shall furnish electronically Operating and Maintenance Manuals outlining in detail the operational features of the following systems:
1. Light Fixtures, Occupancy Controls.
2. Panelboards, circuit breakers and disconnect switches.
3. Metal raceway and PVC system.
4. Cable.
5. Fire alarm system.
6. Devices and cover plates.

1.19 PERMITS

A. This Contractor shall obtain and pay for permits for fire alarm and electrical systems on this project.

1.20 RECORD DRAWINGS

A. A set of record drawings shall be maintained at the job site for reference by the Engineer and Architect. Weekly, the Electrical Foreman will note changes and review drawings periodically with the Engineer. Changes, including feeders, lighting, power, panel schedules and other schedules shall be recorded on the drawings. At the conclusion of the construction this Contractor shall order from the General Contractor a compact disc with all drawing files. All changes shall be made on the disc and shall be compatible to that of AutoCad 2024. Final payment for electrical work is contingent upon receipt of drawings. Cost of record drawings will be borne by this Contractor. See GENERAL CONDITIONS of Division 1.

1.21 TEMPORARY LIGHT AND POWER

A. This Contractor shall furnish, install, maintain and remove at completion of work all necessary temporary electrical distribution wiring.

B. Temporary service shall be obtained from the existing 120/208 volt, 3 phase electrical service currently supporting the facility. Install adequate branch circuit panels throughout the facility to support the needs of the proposed construction.

C. Temporary light shall be based on 100W lamp for rooms up to 500 sq. ft. and two (2) 200W lamps or LED equivalent for every 1000 sq. ft. or fraction thereof. All lamps shall be furnished

and replaced by this Contractor.

D. Panelboards, switches, receptacles, and accessories required for temporary light and power installation shall be provided.

E. Outlets shall be located at convenient points so that extension cords of not over fifty (50) feet will reach work requiring temporary light and power.

F. The General Contractor and Subcontractors, individually, shall furnish cords, sockets, motors and accessories for their work.

G. Temporary wiring, service equipment and accessories thereto installed, shall be removed at the expense of this Contractor after they have served their purpose.

H. The Building Owner is required to pay the cost of electricity consumed by himself and by his Subcontractors. This Contractor shall pay for replacement of lamps broken and/or removed from the premises during the construction period and until date of substantial completion as determined by Architect.

I. Temporary work shall be furnished and installed in conformance with OSHA, local codes and ordinances.

J. The Electrical Contractor shall install and maintain in the building sufficient power for the requirements of the entire facility.

K. Permanent power to fixtures shall not be energized during construction (with the exception of testing) until accepted by the Architect and the Electrical Engineer as being substantial completion of work.

1.22 DEFINITONS

A. The terms "This Contractor", "Electrical Contractor", "Electrical Subcontractor", or "This Section" all refer to the work of this Section 26 00 01.

1.23 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. The General Contractor shall provide and pay for all dumpster services during the entire construction period. Suppliers and Sub-Contractors to bring all rubbish and debris to the dumpster location daily. No costs are to be assessed to the suppliers or Sub-Contractors by the General Contractor for this service.

B. The General Contractor, Sub-Contractors and suppliers, individually, shall furnish their own staging, scaffolding, and hoisting equipment to get workers, material and equipment from the point of delivery at the project site to the point of use or installation within the building and project site.

1.24 WORK CONDITIONS/SEQUENCE

A. If Sub-Contractors find that conditions are not appropriate for them to begin the work of their trade of if they are directed to perform their work out of sequence by the General Contractor, or if the General Contractor directs Sub-Contractors to start and continue regardless of job conditions, the Sub-Contractor shall notify the Architect in writing by certified mail immediately.

PART 2 - PRODUCTS

BASIC MATERIALS & METHODS

2.04 RACEWAYS & FITTINGS

A. Rigid conduit shall be heavy wall hot dipped, galvanized: Midland-Ross, Wheatland or Republic.

B. Minimum size of conduit used shall be 3/4" with no more than 9-#12 conductors. All circuits shall have separate neutrals and grounds.

C. Electrical Metallic Tubing (EMT) shall be mild steel, electrically welded, galvanized, Midland-Ross, Wheatland or Republic.

D. Conduit shall be kept at least six (6) inches away from adjacent copper piping or other copper work on the project.

E. During construction, ends of conduit shall be kept tightly plugged to exclude plaster, dirt, dust, moisture and debris.

F. Ends of conduit entering boxes shall be equipped with galvanized locknuts or bushings. Cut ends of conduit shall be reamed free of burrs and sharp edges.

G. A 200 pound tensile strength plastic line shall be left in each interior conduit run in which permanent wiring is not installed.

H. Feeder conduits entering panels, junction boxes and similar equipment shall be provided with galvanized malleable iron locknuts and O.Z. or union malleable iron bakelite insulated type bushings or approved PVC adapter. Fittings shall have a ground lug and be grounded at all points in the system.

2.05 FIREPROOFING AND CONDUIT SEAL

A. The Electrical Contractor is responsible for all fireproofing of raceways through floors and walls. Provide shop drawings for each through-penetration firestop system, indicating each type of assembly penetrated, relationships to adjoining construction and type of penetrating item. Include UL through-penetration firestop system design designation and qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated.

B. Moisture sealant for all conduit penetrations in the building, manholes, switchgear, etc. shall be as manufactured by Raychem Co. No.RDSS-150 (Rayflate Duct Sealing System).

C. The material to be used for firestopping shall be 3M moldable fire rated putty or 3M No.CP25WB caulk to firestop penetrations in fire rated areas of walls and floors.

D For penetrations through fire-resistance rated assemblies provide through-penetration firestop systems that are produced and installed to resist spread of fire, resist passage of smoke and other gases and maintain original fire-resistance rating of the assembly being penetrated.

D. All through-penetration firestop system for each combination of penetration and assembly shall be obtained from a single manufacturer.

E. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to the specific UL through-penetration system designation requirements. Particular attention shall be paid to the annular space between penetrations and assemblies.

F. Coordinate sizing of sleeves, openings, core-drilled holes or cut openings to accommodate the UL through-penetration firestop systems. Particular attention shall be paid to the annular space between penetrants and assemblies.

G. Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with any items penetrating through-penetration firestop systems under conditions of service and application as demonstrated by the approved through-penetration firestop system manufacturer based on testing and field experience.

2.06 WIRING SYSTEM

A. Wiring shall be installed concealed in the construction. Wiring underground or in concrete slabs shall be installed in heavy wall, rigid conduit or Type PVC40 heavy wall conduit.

B. Joints in wiring shall be made with approved type solderless connectors of the self-insulating type with an insulation equal to that of the conductors being joined. They shall be Minnesota Mining & Manufacturing Co., Type "Y", "R" or "B" Scotchlok, T&B Twist-on-Piggy or TUB one-piece, pressure type, self-insulating wire joint.

C. All branch circuits shall have separate grounds and neutrals.

2.07 WIRE

A. Unless otherwise specified, conductors installed in conduit shall be Type THW or THHN, 600V, 90 degree C. – Rome Cable. Conductors shall be copper.

B. MC shall be Type THHN #12 copper conductors or as noted on the drawings.

C. Covering of wires and cables designed to meet the above specifications shall have distinctive markings as required by the latest standards of UL, Inc., making them readily identifiable in the field.

208Y/120V:

Phase	Color
A	Black
B	Red
C	Blue
Neutral	White
Ground	Green/Bare

2.08 GROUNDING

A. The entire system shall be grounded in accordance with the National Board of Fire Underwriters', State and local requirements.

B. All branch circuits shall have separate neutrals and grounds.

2.09 OUTLET BOXES

A. Outlet boxes shall be Steel City, Appleton, or Raco, galvanized of a type best adaptable to their respective use and in general four (4) square or octagon. Boxes in plaster areas shall be equipped with plaster rings or trim. Studs of suitable size for proper support shall be provided in boxes from which fixtures are to be hung.

B. Boxes installed in tile, block or similar finished walls shall be solid flush type, square cornered, without ears, 1-2-3 and 4-gang as required - Raco, Steel City or Appleton.

C. Outlet boxes shall be provided with only the holes necessary to accommodate conduit connected. Boxes shall be furnished with lugs, ears, covers and/or outlet devices for attachment.

D. All empty junction boxes for low voltage systems, are to have a blank cover plate painted to match the color of the device cover plates for the switch controls and duplex receptacles.

E. Plastic boxes are NOT acceptable.

F. All outlet boxes and related conduits are to be properly secured to the building structure utilizing uni-strut, two hole clips or approved methods.

2.10 PULL AND JUNCTION BOXES

A. Pull and junction boxes shall conform to requirements of the National Electrical Code. They shall be galvanized code gauge steel construction with removable cover plate secured by 1/4" brass machine screws. Junction boxes shall be supported to the building structure.

2.11 SLEEVES

A. It shall be the responsibility of this Contractor to furnish and install sleeves through floors, walls, rated assemblies, etc., where necessary.

B. Sleeves shall be sealed with UL, Inc., approved fire rated material after wires have been installed. Refer to FIRESTOPPING Section.

2.12 WIRING DEVICES

A. Switches shall be Wavelinx Company or equal; refer to plans for types and quantities.

B. Switches shall be Hubbell Co. #DS120-color single pole, DS320-color three way, DS420-color four way Leviton, General Electric or Cooper. All device covers and devices are to be selected by the Architect.

C. Switch and pilot units shall be Hubbell #1297-color or equal manufacturer as listed above.

D. Tamper proof resistant receptacles shall be Hubbell. Co. DR20-COLOR-TR series or equal.

E. Ground fault receptacles shall be Hubbell GFTRST-COLOR series or equal.

F. Grounded type tamper proof duplex receptacles shall be used. Provide ground path either by continuous metal conduit or separate conductor. Flush mounted receptacles shall have ground connection from terminal screw of the receptacle to the outlet box.

G. Plates in general shall be phenolic plastic – color selection by the architect.

H. LED dimmers where shown shall be Cooper Co. or equal #WBSD-010SLD-COLOR to operate with the dimming drivers. Prior to purchasing the dimming controls, coordinate with the lighting manufacturer to ensure that the dimming drivers are capable of operating with the specified dimmer controls as well as the day light dimming sensors. Refer to the low voltage dimming section for additional information.

I. Mounting height from center to finish floor, unless otherwise noted, shall be as follows for wiring devices:
   1. Switches, in general .....48"
   2. Receptacles, in general .....18"
   3. Receptacles with X - See Architectural details for mounting height above counter.

J. All device plates for all switch controls, receptacles, etc., shall be labeled on the outside of the device plate indicating the panel designation, circuit number and voltage using a Brady style adhesive lettering tool. Hand-written designations on the front face will not be acceptable.

2.13 SYSTEM OF LIGHT AND POWER

J. Secondary distribution system shall be 120/208V, three phase, 4 wire, 60 HZ AC.

2.14 POWER WIRING

J. Motors shall be supplied by the HVAC Contractor. Electrical Contractor shall provide power wiring.

K. This Contractor shall wire and install safety disconnect switches and local controls unless otherwise noted in the HVAC Specification.

L. Interlock wiring shall be furnished by the HVAC Contractor and final connections shall be by the HVAC Contractor.

M. Location and sizes of motors shall be reviewed with HVAC Contractor before wiring.

2.15 LIGHTING CONTROL SYSTEM

J. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following (listed alphabetically):

1. Cooper Lighting Solutions WaveLinx Wireless (basis of design)
2. Lithonia/Acuity nLight Air
3. Wattstopper DLM Wireless

2.13 SAFETY DISCONNECT SWITCHES

A. Safety type disconnect switches shall be fused heavy duty EATON Co., Siemens Co., Square D or General Electric. Boxes exposed to rain or wet conditions shall be rain-tight.

B. Switches shall be rated for the voltage as required by the voltage of the circuit on which they are utilized and shall be rated in horsepower; each shall be capable of interrupting the locked rotor current of the motor for which it is to be used, which current shall be assumed as six (6) times the full rated load current. There are two speed two winding starters for many of the motors, as noted on the drawings. All starters are to be furnished by the HVAC Contractor and wired by the Electrical Contractor.

C. Switches shall be fused, quick-make, quick-break type and parts shall be mounted on insulating boxes to permit replacement of any part from the front of the switch. Current-carrying parts shall be high conductivity copper designed to carry the rated load without excessive heating. Switch contacts shall be silver tungsten type or plated to prevent corrosion, pitting and oxidation and to assure suitable conductivity.

2.14 CIRCUIT BREAKERS

A. Circuit breakers for lighting and small power loads shall be bolt-on thermal magnetic, quick-make, quick-break, trip free and sized as designated on panel schedules.

B. Circuit breakers for distribution and power panels shall be bolt-on quick-make, quick-break, trip free, molded case type and sized as shown on panel schedules.

C. Circuit breakers shall be manufactured by EATON Co., Siemens Co., Square D, General Electric or equal.

2.15 PANELS

A. Panels shall be circuit breaker type, sized as indicated on drawings.

B. Panels shall be mounted in code gauge steel cabinets having not less than six (6) inch gutters, equipped with hinged doors, flush catch lock and keys, having surface or flush trims as designed on schedules and drawings.

C. Provide engraved bakelite nameplate on trim of panels, indicating number and voltage.

D. Panels shall have equipment ground buss isolated from the system ground buss to receive the fifth wire, which is the equipment ground wire.

E. Strip cabinets used for low tension system shall be furnished by the panel manufacturer. Cabinets shall have the entire door hinged, with lock and key to match panels, 3/4" plywood backing, terminal strips as required and engraved nameplates on face of cabinet indicating purpose.

F. Panels shall have typewritten legends.

G. Panels shall be EATON Co., Siemens Co., General Electric, Square D, or equal.

H. All panels shall have a door on door with locking devices.

2.16 LOW-VOLTAGE DISTRIBUTION PANELBOARD – THORNDYKE AND LINCOLN STREET SCHOOLS

A. Scope

The Contractor shall furnish and install, where indicated, a 600 ampere, 100% rated, 120/2080 volt, 3 phase, 4 wire, panelboard construction, with a 600 ampere rated main circuit breaker utilizing group mounted circuit protective devices as specified herein, and as shown on the contract drawings.

B. REFERENCES

The low-voltage distribution switchboards and all components shall be designed, manufactured and tested in accordance with the latest applicable following standards:
1. NEMA PB-2
2. UL Standard 891.

C. SUBMITTALS -- FOR REVIEW/APPROVAL

The following information shall be submitted to the Engineer:

1. Master drawing index
2. Front view elevation
3. Floor plan
4. Top view
5. Single line
6. Schematic diagram
7. Nameplate schedule
8. Component list
9. Conduit entry/exit locations
10. Assembly ratings including:
    a. Short-circuit rating
    b. Voltage
    c. Continuous current
11. Major component ratings including
    a. Voltage
    b. Continuous current
    c. Interrupting ratings
12. Cable terminal sizes.

Where applicable, the following additional information shall be submitted to the Engineer:

1. Busway connection
2. Connection details between close-coupled assemblies
3. Composite floor plan of close-coupled assemblies

D. SUBMITTALS -- FOR INFORMATION

When requested by the Engineer, the following product information shall be submitted:

1. Descriptive bulletins
2. Product sheets.

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E. SUBMITTALS -- FOR CLOSEOUT

The following information shall be submitted for record purposes:

1. Final as-built drawings and information for items listed in related sections.
2. Wiring diagrams
3. Certified production test reports
4. Installation information
5. Seismic certification and equipment anchorage details.

F. QUALIFICATIONS

The manufacturer of the assembly shall be the manufacturer of the circuit protective devices within the assembly.

For the equipment specified herein, the manufacturer shall be ISO 9000, 9001 or 9002 certified.

The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

The switchboard shall be suitable for and certified to meet all applicable seismic requirements of Uniform Building Code (UBC); the California Building Code (CBC) for zone 4 application. Guidelines for the installation consistent with these requirements shall be provided by the switchgear manufacturer and be based upon testing of representative equipment. The test response spectrum shall be based upon a 5% minimum damping factor, UBC: a peak of 0.75g, and a ZPA of 0.38g; CBC: a peak of 1.8g, and a ZPA of 0.45g. The tests shall fully envelope this response spectrum for all equipment natural frequencies up to at least 35 Hz.

G. REGULATORY REQUIREMENTS

The low-voltage panelboard shall be UL labeled.

H. DELIVERY, STORAGE AND HANDLING

Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

I. MANUFACTURERS.

EATON
Siemens
Square D. Company
General Electric Company

J. RATINGS

The assembly shall be rated to withstand mechanical forces exerted during short-circuit conditions when connected directly to a power source having available fault current 100,000 amperes symmetrical at rated voltage.

Voltage rating to be as indicated on the drawings.

K. CONSTRUCTION

Switchboard shall consist of the required number of vertical sections bolted together to form a rigid assembly. The sides and rear shall be covered with removable bolt-on covers. All edges of front covers or hinged front panels shall be formed. Provide adequate ventilation within the enclosure.

All sections of the switchboard shall be front and rear aligned with depth as shown on drawings. All protective devices shall be group mounted. Devices shall be front removable and load connections front and rear accessible. Rear access shall be provided.

The assembly shall be provided with adequate lifting means.

The switchboard shall be equal to Square D utilizing the components herein specified and as shown on the drawings.

L. BUS

All bus bars shall be tin-plated aluminum. Main horizontal bus bars shall be mounted with all three phases arranged in the same vertical plane. Bus sizing shall be based on NEMA standard temperature rise criteria of 65 degrees C over a 40 degrees C ambient (outside the enclosure).

Provide a full capacity neutral bus where a neutral bus is indicated on the drawings.

A copper ground bus (minimum 1/4 x 2 inch), shall be furnished firmly secured to each vertical section structure and shall extend the entire length of the switchboard.

All hardware used on conductors shall be high-tensile strength and zinc-plated. All bus joints shall be provided with conical spring-type washers.

M. WIRING/TERMINATIONS

Small wiring, necessary fuse blocks and terminal blocks within the switchboard shall be furnished as required. Control components mounted within the assembly, such as fuse blocks, relays, pushbuttons, switches, etc., shall be suitably marked for identification corresponding to appropriate designations on manufacturer's wiring diagrams.

Mechanical-type terminals shall be provided for all line and load terminations suitable for copper or aluminum cable rated for 75 degrees C of the size as indicated on the drawings.

Lugs shall be provided in the incoming line section for connection of the main grounding conductor. Additional lugs for connection of other grounding conductors shall be provided as indicated on the drawings.

All control wire shall be type SIS, bundled and secured with nylon ties. Insulated locking spade terminals shall be provided for all control connections, except where saddle type terminals are provided integral to a device. All current transformer secondary leads shall first be connected to conveniently accessible short-circuit terminal blocks before

connecting to any other device. All groups of control wires leaving the switchboard shall be provided with terminals blocks with suitable numbering strips. Provide wire markers at each end of all control wiring.

N. MOLDED CASE PROTECTIVE DEVICES

Feeder protective devices shall be molded case circuit breakers with inverse time and instantaneous tripping characteristics and shall have ground fault protection where indicated or as required by NEC. Molded case breakers shall be EATON manufactured or approved equal.

Circuit breakers shall be operated by a toggle-type handle and shall have a quick-make/quick-break over-center switching mechanism that is mechanically trip-free. Automatic tripping of the breaker shall be clearly indicated by the handle position. Contacts shall be non-welding silver alloy, and arc extinction shall be accomplished by means of DE-ION arc chutes. A push-to-trip button on the front of the circuit breaker shall provide a local manual means to exercise the trip mechanism.

Circuit breakers shall have a minimum symmetrical interrupting capacity as indicated on the drawings.

Where indicated circuit breakers shall be UL listed for series application.
Where indicated circuit breakers shall be current limiting. Circuit breakers 600 ampere frame and below shall be EATON Series with thermal-magnetic trip units and inverse time-current characteristics. Refer to the panel schedules for AIC ratings.

O. MISCELLANEOUS DEVICES

Control power transformers with primary and secondary protection shall be provided, as indicated on the drawings, or as required for proper operation of the equipment.

P. CUSTOMER METERING

Provide a separate customer metering compartment with front hinged door and include the following: IQ DATA SPLUS #DP4130.

Current transformers for each meter: Current transformers shall be wired to shorting-type terminal blocks.

Q. ENCLOSURE

NEMA 1 Enclosure

R. PLATES

Engraved nameplates, mounted on the face of the assembly, shall be furnished for all main and feeder circuits as indicated on the drawings. Nameplates shall be laminated plastic, black characters on white background. Characters shall be 3/16-inch high, minimum.

Nameplates shall give item designation and circuit number as well as frame ampere size and appropriate trip rating. Furnish master nameplate giving switchboard designation, voltage ampere rating, short-circuit rating, manufacturer's name, general order number, and item number.

Control components mounted within the assembly, such as fuse blocks, relays, pushbuttons, switches, etc., shall be suitably marked for identification corresponding to appropriate designations on manufacturer's wiring diagrams.

S. FINISH

All exterior and interior steel surfaces of the switchboard shall be properly cleaned and provided with a rust-inhibiting phosphatized coating. Color and finish of the switchboard shall be ANSI 61 light gray.

2.17 TRANSIENT VOLTAGE SURGE SUPPRESSION INTEGRAL DEVICE (TVSS)

A. Integral Transient Voltage Surge Suppressor

1. TVSS shall be Listed in accordance with UL 1449 Second Edition 2005 and UL 1283, Electromagnetic Interference Filters.
2. Integrated surge protective devices (SPD) shall be Component Recognized in accordance with UL 1449 Second Edition, Revision 2/9/2005 Section 37.3 and 37.4 at the standard's highest short circuit current rating (SCCR) of 200 kA, including intermediate level of fault current testing that will be effective 2/9/2007.
3. TVSS shall be tested with the ANSI/IEEE Category C High exposure waveform (20kV-1.2/50μs, 10kA-8/20μs).
4. TVSS shall provide suppression for all modes of protection: L-N, L-G, and N-G in WYE systems.
5. The manufacturer of the TVSS shall be the same as the manufacturer of the service entrance and distribution equipment in which the devices are installed and shipped. Also, this distribution equipment shall be fully tested and certified to the following UL standards:

    a. UL 67 = Panelboards
    b. UL 845 = Motor Control Centers
    c. UL 857 = Busway
    d. UL 891 = Switchboards
    e. UL 1558 = Low Voltage Switchgear.

6. Recommended TVSS ratings:
    a. Minimum surge current rating shall be 160 kA per phase (80 kA per mode) for service entrance and 80 kA per phase (40 kA per mode) for distribution applications.
    b. UL 1449 clamping voltage must not exceed the following:

VOLTAGE	L-N	L-G	N-G

208/120V 600V 600V 600V

c. Pulse life test: Capable of protecting against and surviving 5000 ANSI/IEEE Category C High transients without failure or degradation of clamping voltage by more than 10%.

1. TVSS shall be designed to withstand a maximum continuous operating voltage (MCOV) of not less than 115% of nominal RMS voltage.
2. TVSS shall be constructed of one self-contained suppression module per phase.
3. Visible indication of proper TVSS connection and operation shall be provided. The indicator lights shall indicate which phase as well as which module is fully operable. The status of each TVSS module shall be monitored on the front cover of the enclosure as well as on the module. A push-to-test button shall be provided to test each phase indicator. Push-to-test button shall activate a state change of dry contacts for testing purposes.
4. TVSS shall be equipped with an audible alarm which shall activate when any one of the surge current modules has reached an end-of-life condition. An alarm on/off switch shall be provided to silence the alarm. The switches and alarm shall be located on the front cover of the enclosure.
5. A connector shall be provided along with dry contacts (normally open or normally closed) to allow connection to a remote monitor or other system. The output of the dry contacts shall indicate an end-of-life condition for the complete TVSS or module.
6. Terminals shall be provided for necessary power and ground connections.
7. The TVSS shall be equipped the following optional items:
   a. A transient voltage surge counter shall be located on the diagnostic panel on the front cover of the enclosure. The counter shall be equipped with a manual reset and battery backup to retain memory upon loss of AC power.
8. TVSS shall have a warranty for a period of ten (10) years from date of invoice. Warranty shall be the responsibility of the electrical distribution equipment manufacturer and shall be supported by their respective field service division.

B. MANUFACTURERS

1. Approved Vendors: Square D/Schneider Electric, Surgelogic.IMA Series or approved equal.

2.18 SHORT CIRCUIT AND PROTECTION COORDINATION STUDY

A. SUMMARY

A. The electrical equipment manufacturer shall provide electrical power system studies for the project job. The type and content of each study is specified in the following articles.

B. SUBMITTALS

A. Completed electrical power system studies shall be bound and submitted to the engineer.

C. MANUFACTURERS

A. The specified electrical power system studies shall be performed by Square D Company, General Electric Company, EATON Company or approved equal.

D. ELECTRICAL POWER SYSTEM STUDIES

A. Short-Circuit Analysis

1. Calculation of the maximum rms symmetrical three-phase short-circuit current at each significant location in the electrical system shall be made using a digital computer.
2. Appropriate motor short-circuit contribution shall be included at the appropriate locations in the system so that the computer calculated values represent the highest short-circuit current the equipment will be subjected to under fault conditions.
3. A tabular computer printout shall be included which lists the calculated short-circuit currents, X/R ratios, equipment short-circuit interrupting or withstand current ratings, and notes regarding the adequacy or inadequacy of the equipment.
4. The study shall include a computer printout of input circuit data including conductor lengths, number of conductors per phase, conductor impedance values, insulation types, transformer impedances and X/R ratios, motor contributions, and other circuit information as related to the short-circuit calculations.
5. Include a computer printout identifying the maximum available short-circuit current in rms symmetrical amperes and the X/R ratio of the fault current for each bus/branch calculation.
6. The system one-line diagram shall be computer generated and will clearly identify individual equipment buses, bus numbers used in the short-circuit analysis, cable and bus connections between the equipment, calculated maximum short-circuit current at each bus location and other information pertinent to the computer analysis.
7. A comprehensive discussion section evaluating the adequacy or inadequacy of the equipment must be provided and include recommendations as appropriate for improvements to the system.
8. The contractor shall be responsible for supplying pertinent electrical system conductor, circuit breaker, generator, and other component and system information in a timely manner to allow the short-circuit analysis to be completed prior to final installation.
9. Any inadequacies shall be called to the attention of the engineer and recommendations made for improvements as soon as they are identified.

B. Protective Device Time-Current Coordination Analysis

1. The time-current coordination analysis shall be performed with the aid of computer software intended for this purpose, and will include the determination of settings, ratings, or types for the overcurrent protective devices supplied.
2. Where necessary, an appropriate compromise shall be made between system protection and service continuity with [service continuity considered more important than system protection] [system protection considered more important than service continuity] [system protection and service continuity considered to be of equal importance].
3. A sufficient number of computer generated log-log plots shall be provided to indicate the degree of system protection and coordination by displaying the time-current characteristics of series connected overcurrent devices and other pertinent system parameters.
4. Computer printouts shall accompany the log-log plots and will contain descriptions for

each of the devices shown, settings of the adjustable devices, the short-circuit current availability at the device location when known, and device identification numbers to aid in locating the devices on the log-log plots and the system one-line diagram.
5. The study shall include a separate, tabular computer printout containing the suggested device settings of all adjustable overcurrent protective devices, the equipment where the device is located, and the device number corresponding to the device on the system one-line diagram.
6. A computer generated system one-line diagram shall be provided which clearly identifies individual equipment buses, bus numbers, device identification numbers and the maximum available short-circuit current at each bus when known.
7. A discussion section which evaluates the degree of system protection and service continuity with overcurrent devices, along with recommendations as required for addressing system protection or device coordination deficiencies.
8. Significant deficiencies in protection and/or coordination shall be called to the attention of the engineer and recommendations made for improvements as soon as they are identified.

9. The contractor shall be responsible for supplying pertinent electrical system conductor, circuit breaker, generator, and other component and system information in a timely manner to allow the time-current analysis to be completed prior to final installation.
10. All settings, once finalized, shall be set by a qualified field service technician employed by the electrical distribution equipment manufacturer.

C. Arc-Flash Hazard Analysis

1. The Arc-Flash Hazard Analysis shall be performed with the aid of computer software intended for this purpose in order to calculate Arc-Flash Incident Energy (AFIE) levels and flash protection boundary distances.
2. The Arc-Flash Hazard Analysis shall be performed in conjunction with a short-circuit analysis and a time-current coordination analysis.
3. Results of the Analysis shall be submitted in tabular form, and shall include device or bus name, bolted fault and arcing fault current levels, flash protection boundary distances, personal-protective equipment classes and AFIE levels.
4. The analysis shall be performed under worst-case Arc-Flash conditions, and the final report shall describe, when applicable, how these conditions differ from worst-case bolted fault conditions.
5. The Arc-Flash Hazard Analysis shall be performed by a registered professional engineer.
6. The Arc-Flash Hazard Analysis shall be performed in compliance with IEEE Standard 1584-2002, the IEEE Guide for Performing Arc-Flash Calculations.
7. The Arc-Flash Hazard Analysis shall include recommendations for reducing AFIE levels and enhancing worker safety.
8. The proposed vendor shall demonstrate experience with Arc-Flash Hazard Analysis by submitting names of at least ten actual Arc-Flash Hazard Analyses it has performed in the past year.
9. The proposed vendor shall demonstrate capabilities in providing equipment, services, and training to reduce Arc-Flash exposure and train workers in accordance with NFPA 70E and other applicable standards.
10. The proposed vendor shall demonstrate experience in providing equipment labels in compliance with NEC-2002 section 110 and ANSI Z535.4 to identify AFIE and appropriate Personal Protective Equipment classes.

A. FIRE ALARM SYSTEM – VOICE ACTIVATED – GERALD CREAMER, LINCOLN AND THORNDYKE STREET SCHOOLS

A. SUMMARY

1. This Section covers fire alarm systems, including initiating devices, notification appliances, controls, and supervisory devices. The existing fire alarm systems are to be disconnected and removed in their entirety once the new systems have been installed, tested and fully commissioned by the City of Worcester Fire Department. All existing devise being removed are to be fully patched and replaced with a full size cover plate to properly cover the wall penetration. All existing wiring where accessible is to be disconnected and removed. Thorndyke School will have a new sprinkler system installed within the building.
2. Submit for review Tier 1, Tier 2 and Tier 3 fire alarm submittals inclusive on point-to-point one line riser drawings, battery calculations, floor plans indicating the fire alarm address, fire alarm product submittals.
3. Work covered by this section includes the furnishing of labor, equipment, and materials for installation of the fire alarm system as indicated on the drawings and specifications.
4. The Fire Alarm System shall consist of all necessary hardware equipment and software programming to perform the following functions:
    a. Fire alarm system detection and notification operations.
    b. Control and/or monitoring of elevators, door hold-open devices, fire suppression systems and other equipment as indicated in the drawings and specifications.
    c. One-way supervised automatic voice alarm operations.
5. Network fire alarm control units shall include all features as described in this specification for stand-alone FACPs and shall have network communication capabilities as described herein.
    a. All points monitored and controlled by a single node shall be capable of being programmed as "Public". Each point made public to the network may be programmed to be operated by any other node connected to the network.
    b. Network communications shall be capable of supporting "point lists" that can be handled as though they were a single point.
    c. The network shall provide a means to log into any node on the system via a laptop computer and have complete network access for diagnostics, maintenance reporting, and information gathering of all nodes in the system. The means shall include the capability to log into any node on the system via TCP/IP Ethernet network communications protocol compatible with IEEE Standard 802.3.

B. SCOPE OF WORK

1. Systematically install new fire alarm voice evacuation panels and related remote voice capable annunciators in the building listed and shown on the drawings.
2. Panels shall be installed in locations as shown on the contract design plans.
3. Panels shall be equipped with digital voice equipment to allow custom messaging and simultaneous messages to be played by building.
4. The main command center shall be equipped to make live announcements throughout the building individually or simultaneously.

5. Provide and install new addressable fire alarm initiating and annunciating speaker and strobe units devices throughout the building.

C. SYSTEM DESCRIPTION

1. General
   a. Provide a complete, non-coded addressable, microprocessor-based fire alarm system with initiating devices, notification appliances, and monitoring and control devices as indicated on the drawings and as specified herein.
2. Power Requirements:
   a. The control unit shall receive AC power via a dedicated fused disconnect circuit.
   b. The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal AC power in a normal supervisory mode for a period of 24 hours with 15 minutes of alarm operation at the end of this period. The system shall automatically transfer to battery standby upon power failure. All battery charging and recharging operations shall be automatic.
   c. All circuits requiring system-operating power shall be 24 VDC nominal voltage and shall be individually fused at the control unit.
   d. The incoming power to the system shall be supervised so that any power failure will be indicated at the control unit. A green "power on" LED shall be displayed continuously at the user interface while incoming power is present.
   e. The system batteries shall be supervised so that a low battery or a depleted battery condition, or disconnection of the battery shall be indicated at the control unit and displayed for the specific fault type.
   f. The system shall support NAC Lockout feature to prevent subsequent activation of Notification Appliance Circuits after a Depleted Battery condition occurs in order to make use of battery reserve for front panel annunciation and control.
   g. The system shall support 100% of addressable devices in alarm or operated at the same time, under both primary (AC) and secondary (battery) power conditions.
   h. Loss of primary power shall sound a trouble signal at the FACP. FACP shall indicate when the system is operating on an alternate power supply.
3. Software:
   a. The fire alarm system shall allow for loading and editing instructions and operating sequences as necessary.
   b. The system shall be capable of on-site programming to accommodate system expansion and facilitate changes in operation.
   c. All software operations shall be stored in a non-volatile programmable memory within the fire alarm control unit. Loss of primary and secondary power shall not erase the instructions stored in memory.
   d. Panels shall be capable of full system operation during new site specific configuration download, master exec downloads, and slave exec downloads.
   e. Remote panel site-specific software and executive firmware downloads shall be capable of being performed over proprietary fire alarm network communications.
   f. Panels shall automatically store all program changes to the panel’s non-volatile memory each time a new program is downloaded. Panels shall be capable of storing the active site-specific configuration program and no less than 9 previous revisions in reserve. A compare utility program shall also be available to authorized users to compare any two

of the saved programs. The compare utility shall provide a deviation report highlighting the changes between the two compared programs.

g. Panels shall provide electronic file storage with a means to retrieve a record copy of the site-specific software and up to 9 previous revisions. Sufficient file storage shall be provided for other related system documentation such as record drawings, record of completion, owner's manuals, testing and maintenance records, etc.

h. The media used to store the record copy of site-specific software and other related system documentation shall be electrically supervised. If the media is removed a trouble shall be reported on the fire alarm control unit.

4. History Logs:
   a. The system shall provide a means to recall alarms and trouble conditions in chronological order for the purpose of recreating an event history. A separate alarm and trouble log shall be provided.
5. Recording of Events:
   a. The system shall be capable of recording all alarm, supervisory, and trouble events by means of system printer. The printout shall include the type of signal (alarm, supervisory, or trouble) the device identification, date, and time of the occurrence. The printout shall differentiate alarm signals from all other printed indications.
6. Wiring/Signal Transmission:
   a. Transmission shall be hard-wired using separate addressable signal transmission, dedicated to fire alarm service only.
   b. System connections for initiating device circuits shall be Class A and notification appliance circuits shall be Class B.
   c. Circuit Supervision: Circuit faults shall be indicated by a trouble signal at the FACP. Provide a distinctive indicating audible tone and alphanumeric annunciation.
   d. Constant Supervision Audio: When provided, audio notification appliance circuits shall be supervised during standby by monitoring for DC continuity to end-of-line resistors.
7. Required Functions:
   The Following are required system functions and operating features:
   a. Priority of Signals: Fire alarm events have highest priority and have secondary priority based upon emergency condition. Subsequent alarm events are queued in the order received and do not affect alarm conditions. Priority Two, Supervisory and Trouble events have primary, based upon emergency condition]-, third-, and fourth-level priority, respectively. Signals of a higher-level priority take precedence over signals of lower priority even though the lower-priority condition occurred first. Annunciate all events regardless of priority or order received.
   b. Noninterfering: An event on one zone does not prevent the receipt of signals from any other zone. All zones are manually resettable from the FACP after the initiating device or devices are restored to normal. The activation of an addressable device does not prevent the receipt of signals from subsequent addressable device activations.
   c. Transmission to an approved Supervising Station: Automatically route alarm, supervisory, and trouble signals to an approved supervising station service provider, under another contract.
   d. Annunciation: Operation of alarm and supervisory initiating devices shall be annunciated at the FACP and the remote annunciators, indicating the type of device, the operational state of the device (i.e. alarm, trouble or supervisory) and shall display the custom label associated with the device.

e. Selective Alarm: A system alarm shall include:
   i. Indication of alarm condition at the building FACP(S).
   ii. Identification of the device that is the source of the alarm at the building FACP(S).
   iii. Record the event in the FACP historical log.
   iv. Operation of standard and/or custom voice messaging audible until silenced at FACP.
   v. Operation of visible notification appliances.
   vi. Closing doors normally held open by magnetic door holders
   vii. Unlocking designated doors.
   viii. Shutting down supply and return fans as required.
   ix. Closing smoke dampers on system as required.
   x. Transmission of signal to the Westford Fire Department via the radio digital master-boxes located within each building.

f. Supervisory Operations: Upon activation of a supervisory device such as a fire pump power failure, low air pressure switch, tamper switch, etc., the system shall operate as follows:
   i. Activate the system supervisory service audible signal and illuminate the LED at the building FACP, the Campus Police NDU and the annunciator(s).
   ii. Pressing the Supervisory Acknowledge Key will silence the supervisory audible signal while maintaining the Supervisory LED "on" indicating off-normal condition.
   iii. Record the event in the FACP historical log.
   iv. Transmission of supervisory signal to the supervising station.
   v. Restoring the condition shall cause the Supervisory LED to clear and restore the system to normal.

g. Alarm Silencing: If the "Alarm Silence" button is pressed, all audible and visible alarm signals shall cease operation.

h. Priority Two Operations: Upon activation of a priority two condition, the system shall operate as follows:
   i. Activate the system priority two audible signal and illuminate the LED at the Record the event in the FACP historical log.
   ii. Pressing the Priority 2 Acknowledge Key will silence the audible signal while maintaining the Priority 2 LED "on" indicating off-normal condition.
   iii. Record the event in the FACP historical log.
   iv. Restoring the condition shall cause the Priority 2 LED to clear and restore the system to normal.

i. System Reset: The "System Reset" button shall be used to return the system to its normal state.
   i. Display messages shall provide operator assurance of the sequential steps ("IN PROGRESS", "RESET COMPLETED") as they occur.
   ii. The system shall verify all circuits or devices are restored prior to resetting the system to avoid the potential for re-alarming the system.
   iii. The display message shall indicate "ALARM PRESENT, SYSTEM RESET ABORTED."
   iv. Should an alarm condition continue, the system will remain in an alarmed state.

j. Walktest: The system shall have the capacity of 8 programmable passcode protected one person testing groups, such that only a portion of the system need be disabled during testing. The actuation of the "enable one person test" program at the control unit shall activate the "One Person Testing" mode of the system as follows:

i. The city circuit connection and any suppression release circuits shall be bypassed for the testing group.
ii. Control relay functions associated with one of the 8 testing groups shall be bypassed.
iii. The control unit shall indicate a trouble condition.
iv. The alarm activation of any initiating device in the testing group shall cause the audible notification appliances assigned only to that group to sound a code to identify the device or zone.
v. The unit shall automatically reset itself after signaling is complete.
vi. Any opening of an initiating device or notification appliance circuit wiring shall cause the audible signals to sound for 4 seconds indicating the trouble condition.

k. Install Mode: The system shall provide the capability to group all non-commissioned points and devices into a single "Install Mode" trouble condition allowing an operator to clearly identify event activations from commissioned points and devices in occupied areas.
i. It shall be possible to individually remove points from Install Mode as required for phased system commissioning.
ii. It shall be possible to retrieve an Install Mode report listing that includes a list of all points assigned to the Install Mode. Panels not having an install mode shall be reprogrammed to remove any non-commissioned points and devices.

8. Fire Sprinkler Device Monitoring – where applicable:
   a. Water flow: Activation of a water flow switch shall initiate general alarm operations.
   b. Sprinkler valve tamper switch: The activation of any valve tamper switch shall activate system supervisory operations.
9. Audible Alarm Notification:
   a. By voice evacuation and tone signals on loudspeakers in areas as indicated on drawings.
   b. Provide a minimum of (10) custom voice messages specifically created for this project.
10. Automatic Voice Evacuation Sequence:
   a. The audio alarm signal shall consist of an alarm tone for a maximum of five seconds followed by an automatic digital voice message. At the end of the voice message, the alarm tone shall resume. This sequence shall sound continuously until the "Alarm Silence" switch is activated.
   b. All audio operations shall be activated by the system software so that any required future changes can be facilitated by authorized personnel without any component rewiring or hardware additions.
11. Manual & Voice Paging – From the Building Fire Alarm Panel and remote annunciators.
   a. The system shall be configured to allow voice paging. Upon activation of any speaker manual control switch, the alarm tone shall be sounded over all speakers in the building.
   b. The control unit operator shall be able to make announcements via the push-to-talk paging microphone over the pre-selected speaker circuits.
   c. Total building paging shall be accomplished by the means of an "All Call" switch.
12. Addressable Notification Appliances:
   a. Monitoring: The FACP shall monitor individual addressable notification appliances for status, condition, type of appliance, and configured appliance settings. A fault in any individual appliance shall automatically report a trouble condition on the FACP.
   b. Individual Appliance Custom Label: Each addressable appliance shall have its own 40-character custom label to identify the location of the appliance and to aid in troubleshooting fault conditions.

c. Individual Appliance Information Display: The FACP shall be capable of calling up detailed information for each addressable appliance including the appliance location, status, condition, type of appliance, and configured appliance settings.
d. Programmable Appliance Settings: The selectable operation of each addressable notification appliance shall be capable of being configured by the FACP without having to replace or remove the appliance from the wall or ceiling.
e. Programmable appliance settings for applicable addressable notification appliances shall include:
    i. Operation:
    ii. Style:
    iii. Candela Selections:
f. System shall not require replacement or removal of the appliances from the wall or ceiling to change their applicable operation or settings.
g. Programmable Notification Zones: Changing the notification zone assigned to a notification appliance shall be configurable by the FACP and shall not require additional circuits or wiring.
h. Addressable Notification Appliance Automated Self-Test: The fire alarm control unit shall be capable of performing an automated functional self-test of all self-test notification appliances and meet the requirements in NFPA 72, 2013 Edition, 14.2.8 Automated Testing and Table 14.4.3.2 testing requirements.
i. Addressable Notification Appliance Automated Self-Test:
    i. The fire alarm control unit shall be capable of performing an automated functional self-test of all self-test notification appliances and meet the requirements in NFPA 72, 2013 Edition, 14.2.8 Automated Testing and Table 14.4.3.2 testing requirements.
    ii. Test results for each self-test notification appliance shall be stored in non-volatile memory at the fire alarm control unit.
    iii. The fire alarm control unit shall be capable of running a functional automated test for all self-test notification appliances in a general alarm group or for all self-test appliances within a specific notification zone.
    iv. The duration required to complete the automated functional test for all self-test notification appliances shall be accomplished in 2 minutes or less.
    v. The automated test results for all self-test notification appliances shall be available from the fire alarm control unit within 4 minutes from the start of the test.
    vi. If any notification appliance fails its automated functional self-test an audible and visual trouble signal shall be annunciated at the fire alarm control unit.
    vii. The self-test trouble signal shall be a latching trouble signal which requires manual restoration to normal.
j. Addressable Notification Appliance Reports:
    i. The fire alarm control unit shall maintain configuration and test data for each self-test addressable notification appliance.
    ii. The fire alarm control unit shall be capable of generating configuration, self-test, and deficiency reports, which can be viewed through the fire alarm control unit user interface or printed via the fire alarm control unit service port.
    iii. The fire alarm control unit shall also be capable of providing a deficiency report that includes a list of all self-test notification appliances that have failed self-test.
k. Magnet test: When the control unit is in diagnostic mode, the appliances shall be capable of being tested with a magnet. The magnet diagnostics shall:

i. Pulse the appliance LED to indicate appliance address
ii. Briefly flash the individual strobe to confirm visible appliance operation.
iii. Briefly sound the individual speaker to confirm the audible appliance operation.

D. SUBMITTALS

1. General: Submit the Following according to Conditions of the Contract.
   a. Product data sheets for system components highlighted to indicate the specific products, features, or functions required to meet this specification. Alternate or as-equal products submitted under this contract must provide a detailed line-by-line comparison of how the submitted product meets, exceeds, or does not comply with this specification.
   b. Wiring diagrams from manufacturer.
   c. Shop drawings showing system details including location of FACP, all devices, and specific circuiting. Drawings with general circuit information will not be acceptable.
   d. System power and battery charts with performance graphs and voltage drop calculations to assure that the system will operate in accordance with the prescribed backup time periods and under all voltage conditions per UL and NFPA standards.
   e. Panel layout drawings detailing all components and circuitry.
   f. System operation description including method of operation and supervision of each type of circuit and sequence of operations for all manually and automatically initiated system inputs and outputs. A list of all input and output points in the system shall be provided with a label indicating location or use of IDC, SLC, NAC, relay, sensor, and auxiliary control circuits.
   g. Operating instructions for FACP.
   h. Operation and maintenance data for inclusion in Operating and Maintenance Manual. Include data for each type, product, including all features and operating sequences, both automatic and manual. Provide the names, addresses, and telephone numbers of service organizations.
   i. Letter from a representative of the manufacturer of the fire alarm system that the installer is experienced in installing the specified system.
   j. NICET Level IV certified individual employed by the system provider shall review and sign shop drawings prior to submission to Electrical Engineer.
   k. Record of field tests of system.
2. Submission to Authority Having Jurisdiction: In addition to routine submission of the above material, make an identical submission to the authority having jurisdiction. Include copies of shop drawings as required to depict component locations to facilitate review. Upon receipt of comments from the Authority, make resubmissions, if required, to make clarifications or revisions to obtain approval.

E. QUALITY ASSURANCE

1. Installer Qualifications: Installing contractors shall meet all of the following criteria:
   a. Installers shall be knowledgeable and experienced with the type and complexity of the fire alarm system specified.
   b. Installers shall meet all local and state qualifications including current electrical licensure for installing fire alarm systems.
   c. Installer shall provide a letter from the system manufacturer during the submittal process that they are experienced in installing the specified manufactures equipment. Provide 3 references of similar projects completed within the last five years.

2. Each and every item of the Fire Alarm System shall be listed under the appropriate category by a Nationally Recognized Testing Laboratory and shall bear the respective "NRTL" label.

F. PROJECT CONDITIONS

1. Interruption of Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:
2. Notify Architect no fewer than two days in advance of proposed interruption of fire-alarm service.
3. Do not proceed with interruption of fire-alarm service without Architect's written permission.

G. SEQUENCING AND SCHEDULING

1. Fire-Alarm Equipment: Maintain equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service and label fire-alarm equipment "NOT IN SERVICE" until removed from the building.

H. MAINTENANCE SERVICE

1. Warranty: Provide replacement of any new equipment for a period of 12 months, using factory-authorized service representatives.
2. Additional Services: Within 12-month period following the completion of the project include (8) hours of tech labor each quarter (total of 32 hours) for adjustment of system. This may include sounds levels of speakers, renaming of device addresses, etc.
3. Maintenance Service Contract: No later than 60 days prior to the expiration of the warranty, deliver to the Owner a proposal to provide contract maintenance and repair services for an additional one-year term. As an option with this proposal, deliver to the Owner a proposal to provide scheduled inspection and testing services for a one-year term. Owner will be under no obligation to accept maintenance service contract proposal or inspection and testing proposal.

I. EXTRA MATERIALS

1. General: Furnish extra materials, packaged with protective covering for storage, and identified with labels clearly describing contents as follows:
   a. Manual Stations: Furnish quantity equal to 15 percent of the number of manual stations installed.
   b. Notification Appliances: Furnish quantity equal to 10 percent of each type and number of units installed, but not less than one of each type.
   c. Smoke Detectors or Sensors, Heat Detectors: Furnish quantity equal to 10 percent of each type and number of units installed but not less than one of each type.
   d. Detector or Sensor Bases: Furnish quantity equal to 10 percent of the total number of smoke detector heads provided.

PRODUCTS:

J. ACCEPTABLE EQUIPMENT AND SERVICE PROVIDERS

1. Manufacturers: The equipment and service described in this specification are those supplied and supported by Notifier/Honeywell Co.' Edwards, Silent Knight and represent the base bid for the equipment.

2. Subject to compliance with the requirements of this specification, provide products by the following:
   a. Notifier/Honeywell Co. Inc.
3. Being listed as an acceptable Manufacturer in no way relieves obligation to provide all equipment and features in accordance with these specifications.
4. The equipment and service provider shall be a nationally recognized company specializing in fire alarm and detection systems. This provider shall employ factory trained and NICET Level III technicians and shall maintain a service organization within 25 miles of this project location. The equipment and service provider shall have a minimum of 10 years experience in the fire protective signaling systems industry.

K. SYSTEMS OPERATIONAL DESCRIPTION

1. Fire-alarm signal initiation shall be by one or more of the following devices and systems:
   a. Manual stations.
   b. Heat detectors.
   c. Smoke detectors.
   d. Duct smoke detectors.
   e. Automatic sprinkler system water flow.
2. Fire-alarm signal shall initiate the following actions:
   a. Continuously operate alarm notification appliances.
   b. Identify alarm at fire-alarm control unit, Campus Police Network Display Unit and remote annunciators.
   c. Transmit an alarm signal to the remote alarm receiving station.
   d. Unlock electric door locks in designated egress paths.
   e. Release fire and smoke doors held open by magnetic door holders if required.
   f. Activate voice/alarm communication message in the building in alarm and simultaneously activate an information message in the other buildings on campus.
   g. Close smoke dampers in air ducts of designated air-conditioning duct systems.
   h. Recall elevators to primary or alternate recall floors as required.
   i. Record events in the system memory.
   j. Record events by the system printer.
3. Supervisory signal initiation shall be by one or more of the following devices and actions:
   a. Valve supervisory switch – where applicable.
4. System trouble signal initiation shall be by one or more of the following devices and actions:
   a. Open circuits, shorts, and grounds in designated circuits.
   b. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
   c. Loss of primary power at fire-alarm control unit.
   d. Ground or a single break in fire-alarm control unit internal circuits.
   e. Abnormal AC voltage at fire-alarm control unit.
   f. Break in standby battery circuitry.
   g. Failure of battery charging.
   h. Abnormal position of any switch at fire-alarm control unit or annunciator.
5. FACP (Fire alarm control unit), FACP and remote annunciators.

L. FIRE ALARM CONTROL UNIT

1. Notifier model number NFS-3200(E)/DVC series complete with all voice capability, amplifiers.
2. Cabinet Model number shall be CAB-4 series.
3. Comply with UL 864, "Control Units and Accessories for Fire Alarm Systems".
4. The following FACP hardware shall be provided:
   a. Power Limited base panel with platinum cabinet and door, 120 VAC input power.
   b. 2,500 point capacity where (1) point equals (1) monitor (input) or (1) control (output).
   c. 2000 points of annunciation where one (1) point of annunciation equals:
   d. 1 LED driver output on a graphic driver or 1 switch input on a graphic switch input module.
   e. 1 LED on panel or 1 switch on panel.
   f. 9 Amp Power Supply minimum with temperature compensated dual-rate battery charger capable of charging up to 110 Ah batteries without a separate external battery charger. Battery charger voltage and amperage values shall be accessible on the FACP LCD display.
   g. One Auxiliary electronically resettable fused 2A @24VDC Output, with programmable disconnect operation for 4-wire detector reset.
   h. One Auxiliary Relay, SPDT 2A @32VDC, programmable as a trouble relay, either as normally energized or de-energized, or as an auxiliary control.
   i. Three (3) Class B Addressable Notification Appliance Signaling Line Circuits (SLCs).
   j. Each Addressable Notification Appliance SLC shall be rated at 3A and capable of supporting up to 127 Notification Appliances per channel.
   k. Wiring shall be 18 AWG to 12 AWG unshielded twisted pair wire. Systems that require shielded wire for Notification Appliances shall not be accepted.
   l. A constant voltage under both primary and secondary power conditions shall be maintained at the notification appliance field wiring terminal connections in the FACP to ensure the voltage drop on the circuit is consistent under both primary and secondary power conditions.
   m. For systems that do not provide a constant voltage source at the FACP notification appliance field wiring terminal connections, the fire alarm contractor shall:
      i. Provide separate point-to-point voltage drop calculations for all notification appliances under worst case secondary power specifications, and
      ii. Perform a complete functional test of all notification appliances under worst case secondary power conditions.
   n. Expansion Power Supplies with minimum of three (3) Class B integral Intelligent Addressable Notification Appliance Signaling Line Circuits (SLCs) for system expansion. Expansion power supplies shall provide complete capability as the primary power supply. Notifier model number FCPS-24S8R(C/E) series.
   o. Digital audio amplifiers with 25vdc or 70vdc operation.
   p. Four (4) form "C" Auxiliary Relay Circuits (Form C contacts rated 2A @ 24VDC, resistive), operation is programmable for trouble, alarm, supervisory or other fire response functions.
   q. The FACP shall support up to (5) RS-232-C ports and one service port. All (5) RS-232 Ports shall be capable of two-way communications.
   r. Remote Unit Interface: supervised serial communication channel for control and monitoring of remotely located annunciators and I/O panels.
   s. Programmable DACT for either Common Event Reporting or per Point Reporting.

t. Modular Network Communications Card.

5. Cabinet: Lockable steel enclosure. Arrange unit so all operations required for testing or for normal care and maintenance of the system are performed from the front of the enclosure. If more than a single unit is required to form a complete control unit, provide exactly matching modular unit enclosures.
6. Alphanumeric Display and System Controls: Panel shall include an 80 character LCD display to indicate alarm, supervisory, and component status messages and shall include a keypad for use in entering and executing control commands.
   a. The system shall have the capability to provide expanded content, multi-line, operator interface displays. The expanded content multi-line displays shall be Quarter-VGA (QVGA) or larger and be capable of supporting a minimum of 854 standard ASCII characters to minimize or eliminate the levels of navigation required for access to information when responding to critical emergencies and abnormal system conditions. The QVGA operator interface shall provide operator prompts and six context sensitive soft-keys for intuitive operation.
7. Voice Alarm: Provide a digital emergency communication system, integral with the FACP, including voice alarm system components, microphones, and amplifiers. Features include:
   a. Amplifiers comply with UL 1711, "Amplifiers for Fire Protective Signaling Systems." Amplifiers shall provide an onboard local mode temporal coded horn tone as a default backup tone. Test switches on the amplifier shall be provided to test and observe amplifier backup switchover. Each amplifier shall communicate to the host panel amplifier and NAC circuit voltage and current levels for display on the user interface. Each amplifier shall be capable of performing constant supervision for non-alarm audio functions such as background music and general paging. Notifier DAA2 series.
   b. Emergency voice communication audio controller module shall provide up to 32 minutes of message memory for digitally stored messages. Provide supervised connections for master microphone and up to 5 remote microphones.
   c. Status annunciator indicating the status of the various voice alarm speaker zones.

M. ADDRESSABEL INITIATING

1. Addressable Manual Pull Stations: Notifier Model Number NBG-12LX
   a. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
   b. Description: Addressable double action type, red LEXAN. Station shall mechanically latch upon operation and remain so until manually reset by opening with a key common with the control units. Station shall be pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit. Where double-action stations are provided, the mechanism shall require two actions to push top activation door to initiate an alarm.
   c. Provide with a front showing red LED showing that will flash each time it is scanned by the Control Unit (once every 4 seconds). In alarm condition, the station LED shall be on steady.
   d. Indoor Protective Shield: Provide a factory-fabricated, tamperproof, clear LEXAN enclosure shield and red frame that easily fits over manual pull stations which shall be hinged at the top to permit lifting for access to initiate a local alarm. Unit shall be NRTL

listed. Lifting the cover shall actuate an integral battery-powered audible horn intended to discourage false-alarm operation. The horn shall be silenced by lowering and realigning the shield. The horn shall provide 85dB at 10 feet and shall be powered by a 9 VDC battery.

2. Intelligent Photoelectric Smoke Detector - Notifier model number FSP-951 series
   a. General: Comply with UL 268, "Smoke Detectors for Fire Protective Signaling Systems." Include the following features: Factory Nameplate: Serial number and type identification.
   b. Operating Voltage: 24 VDC, nominal.
   c. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore normal operation.
   d. Plug-In Arrangement: Sensor and associated electronic components are mounted in a module that connects to a fixed base with a twist-locking plug connection. Base shall provide break-off plastic tab that can be removed to engage the head/base locking mechanism. No special tools shall be required to remove head once it has been locked. Removal of the detector head shall interrupt the supervisory circuit of the fire alarm detection loop and cause a trouble signal at the control unit.
   e. Each sensor shall be scanned by the Control Unit for its type identification to prevent inadvertent substitution of another sensor type. Upon detection of a "wrong device", the control unit shall operate with the installed device at the default alarm settings for that sensor; 2.5% obscuration for photoelectric sensor, 135-deg F and 15-deg F rate-of-rise for the heat sensor but shall indicate a "Wrong Device" trouble condition.
   f. The sensor's electronics shall be immune from false alarms caused by EMI and RFI.
   g. Panel shall have the ability to detect a sensor head that has been moved to another location.
   h. Type: Smoke sensors shall be of the photoelectric or combination photoelectric/heat type. If combination photoelectric / heat type devices are used, the option to allow both technologies to work together or independently shall be available. Example: Heat detector when activated will cause an alarm on the fire alarm control panel; smoke detector will provide a local alarm only through a sounder base. Where acceptable per manufacturer specifications, ionization type sensors may be used.
3. Duct smoke detectors shall come complete with photoelectric smoke detector, housing, sensing tube and remote LED test keyed switch.
   a. Notifier model number DNR(A) series and RTS151 remote test station.
   b. Intelligent Thermal Detectors - Notifier model number FST-951 series.
   c. Thermal Sensor: Combination fixed-temperature and rate-of-rise unit with plug-in base and alarm indication lamp; 135-deg F fixed-temperature setting except as indicated.
   d. Thermal sensor shall be of the epoxy encapsulated electronic design. It shall be thermistor-based, rate-compensated, self-restoring and shall not be affected by thermal lag.
   e. Sensor fixed temperature sensing shall be independent of rate-of-rise sensing and] programmable to operate at 135-deg F or 155-deg F. Sensor rate-of-rise temperature detection shall be selectable at the FACP for either 15-deg F or 20-deg F per minute.
   f. Sensor shall have the capability to be programmed as a utility monitoring device to monitor for temperature extremes in the range from 32-deg F to 155-deg F.
4. Addressable Circuit Interface Modules – Notifier Model FCM-1(A); FMM-1(A); FRM-1(A) Series.

a. Arrange to monitor or control one or more system components that are not otherwise equipped for addressable communication. Modules shall be used for monitoring of waterflow, valve tamper, non-addressable devices, and for control of AHU systems.
b. Addressable Circuit Interface Modules will be capable of mounting in a standard electric outlet box. Modules will include cover plates to allow surface or flush mounting. Modules will receive their operating power from the signaling line circuit or a separate two wire pair running from an appropriate power supply, as required.
c. There shall be the following types of modules:
   i. Type 1: Monitor Circuit Interface Module
      - For conventional 2-wire smoke detector and/or contact device monitoring with Class B or Class A wiring supervision. The supervision of the zone wiring will be Class B. This module will communicate status (normal, alarm, trouble) to the FACP.
      - For conventional 4-wire smoke detector with Class B wiring supervision. The module will provide detector reset capability and over-current power protection for the 4-wire detector. This module will communicate status (normal, alarm, trouble) to the FACP.
   ii. Type 2: Line Powered Monitor Circuit Interface Module –
      - This type of module is an individually addressable module that has both its power and its communications supplied by the two wire signaling line circuit. It provides location specific addressability to an initiating device by monitoring normally open dry contacts. This module shall have the capability of communicating four zone status conditions (normal, alarm, current limited, trouble) to the FACP.
      - This module shall provide location specific addressability for up to five initiating devices by monitoring normally closed or normally open dry contact security devices. The module shall communicate four zone status conditions (open, normal, abnormal, and short). The two-wire signaling line circuit shall supply power and communications to the module.
   iii. Type 3: Single Address Multi-Point Interface Modules –
      - This multipoint module shall provide location specific addressability for four initiating circuits and control two output relays from a single address. Inputs shall provide supervised monitoring of normally open, dry contacts and be capable of communicating four zone status conditions (normal, open, current limited, and short). The input circuits and output relay operation shall be controlled independently and disabled separately.
      - This dual point module shall provide a supervised multi-state input and a relay output, using a single address. The input shall provide supervised monitoring of two normally open, dry contacts with a single point and be capable of communicating four zone status conditions (normal, open, current limited, and short). The two-wire signaling line circuit shall supply power and communications to the module.
      - This dual point module shall monitor an unsupervised normally open, dry contact with one point and control an output relay with the other point, using a single address. The two-wire signaling line circuit shall supply power and communications to the module.
   iv. Type 4: Line Powered Control Circuit Interface Module –

- This module shall provide control and status tracking of a Form "C" contact. The two-wire signaling line circuit shall supply power and communications to the module.

d. All Circuit Interface Modules shall be supervised and uniquely identified by the control unit. Module identification shall be transmitted to the control unit for processing according to the program instructions. Modules shall have an on-board LED to provide an indication that the module is powered and communicating with the FACP. The LEDs shall provide a troubleshooting aid since the LED blinks on poll whenever the peripheral is powered and communicating.

5. Carbon Monoxide Detectors - model number CO1224TR with sounder trouble relay and capable of initiating a Temporal 4 code sound at the source to indicate that carbon monoxide is present.

N. ADDRESSABLE NOTIFICATION

1. Addressable Alarm Notification Appliances:
   a. The Contractor shall furnish and install Addressable Notification Appliances and accessories to operate on compatible signaling line circuits (SLC).
   b. Addressable Notification appliance operation shall provide power, supervision and separate control of horns and strobes over a single pair of wires. The controlling channel (SLC) digitally communicates with each appliance and receives a response to verify the appliance's presence on the channel. The channel provides a digital command to control appliance operation. SLC channel wiring shall be unshielded twisted pair (UTP), with a capacitance rating of less than 60pf/ft and a minimum 3 twists (turns) per foot.
   c. All Notification Appliances shall operate as a completely independent device allowing for specific location alerting of both fire alarm and Mass Notification functions. Each visible device (both clear fire alarm and amber mass notification) shall be capable of operating on multiple notification zones or completely separate from all other notification devices, this allows “On the fly” program operation changes for Mass Notification alerting and fire alarm notification.
   d. All Notification Appliances shall operate as a completely independent device allowing for appliances in handicap accessible rooms and other locations to operate on the same SLC and to activate individually based on an alarm condition in a room or as part of a general alarm condition where all appliances activate together.
   e. Individual Notification Appliances shall be able to be grouped into zones (or operational groups) by central programming at the main fire alarm control unit.
   f. Notification Appliances shall provide for “unobtrusive” testing. Each Notification Appliance shall be tested for audible and visible operation on an individual basis at the device or from the main fire alarm control unit, allowing for minimal invasive impact.
   g. Each Addressable notification appliance shall contain an electronic module and a selectable address setting to allow it to occupy a unique location on the channel. This on-board module shall also allow the channel to perform appliance diagnostics that assist with installation and subsequent test operations. A visible LED on each appliance shall provide verification of communications and shall flash with the appliances address setting when locally requested using a magnetic test tool.
   h. Each addressable notification appliance shall have electrical test point access without removing the device cover.
   i. Both wall mount and ceiling mount devices shall be available.
2. Addressable Visible/Only – Notifier model number SRL(A) series:

a. Addressable strobe shall be listed to UL 1971.
b. The V/O device shall consist of a xenon flash tube and associated lens/reflector system, cover and mounting plate. For ease of installation the mounting plate shall mount directly to standard single gang, double gang or 4" square electrical box, without the use of special adapters or trim rings.
c. When the appliance is connected to an active circuit, the front cover of the appliance shall be removable without causing a trouble indication on the fire alarm control unit.
d. Appliances shall be wired with UTP conductors, having a minimum of 3 twists per foot. The V/O appliance shall be provided with multiple minimum flash intensities of 15cd, 30cd, 75cd, 110cd, 135cd and 185cd.
e. The Candela levels shall be settable from the fire alarm control unit or by using a hardware selector on the appliance.

3. Addressable Speaker/Visible – Notifier model number SPSRL (Wall), SPSCWL(A)-P (Ceiling):
   a. Combination Speaker/Visible (S/V) units combine the speaker and visible functions into a common housing.
   b. The S/V shall be listed to UL 1971 and UL 1480. Addressable functionality controls visible operation, while the speaker shall operate on a 25VRMS or 70.7VRMS NAC.
   c. Operational functions of a conventional Speaker above shall apply to this section.
   d. Operational functions and features of Addressable Strobe above shall apply to this section.
   e. Wall mount appliances shall be available in White and Red and ceiling mount appliances shall be available in White, Red, and Black. Labeling shall be available as either “FIRE”, “ALERT” or no labeling.
4. Isolator Module:
   a. Isolator module provides short circuit isolation for addressable notification appliance SLC wiring. Isolator shall be listed to UL 864.
   b. The Isolator shall mount directly to a minimum 2 1/8" deep, standard 4" square electrical box, without the use of special adapter or trim rings.
   c. Power and communications shall be supplied by the Addressable Controller channel SLC; dual port design shall accept communications and power from either port and shall automatically isolate one port from the other when a short circuit occurs.
   d. The following functionality shall be included in the Isolator module:
      i. Report faults to the host FACP.
      ii. On-board Yellow LED provides module status.
   e. After the wiring fault is repaired, the Isolator modules shall test the lines and automatically restore the connection.
5. Accessories: The contractor shall furnish the necessary accessories.
6. Addressable Appliance SLC Repeaters – Confirm with manufacturer.
   a. Addressable Repeater shall supervise channel (SLC) wiring and communicate with and control addressable notification appliances.
   b. The Repeater shall be a stand-alone panel capable of powering one (1) NAC SLC.
   c. The channel (SLC) shall be rated for 3 amps and support up to 127 addresses.
   d. Power and communication for the notification appliances shall be provided on the same pair of wires.
   e. It shall be possible to program the High/Low setting of the audible (horn) appliances by channel from the addressable controller.

f. The Repeater shall provide a constant voltage output to ensure NAC current and voltage do not vary whether the panel is operating on AC or battery. The output voltage during alarm conditions shall be 29 VRMS.
g. Addressable SLC notification appliance circuits shall be Class B, Style 4.
h. For Class B circuits, the Repeater shall support up to 4 Class B branches directly at its output terminals for one SLC.
i. The internal power supply and battery charger shall be capable of charging up two 12.7 Ah batteries internally mounted or 25Ah batteries mounted in an external cabinet.
j. The Repeater panel can be mounted close to the host fire alarm control unit or remotely.
k. The Repeater status shall be communicated to the host fire alarm control unit and locally indicated.
l. A 200mA auxiliary output shall be available
m. The Repeater shall be listed to UL 864

7. Magnetic Door Holders
   a. Description: Units shall be listed to UL 228. Units are equipped for wall or floor mounting as indicated and are complete with matching door plate. Unit shall operate from a 120VAC, a 24VAC or a 24VDC source, and develop a minimum of 25 lbs. holding force.
   b. Material and Finish: Match door hardware.
8. Remote LCD Annunciators:
   a. Provide remote LCD Annunciators, where shown with the same "look and feel" as the FACP operator interface. The Remote LCD Annunciator shall use the same Primary Acknowledge, Silence, and Reset Keys; Status LEDs and LCD Display as the FACP.
   b. Annunciator shall have super-twist LCD display with two lines of 40 characters each. Annunciator shall be provided with four (4) programmable control switches and associated LEDs.
   c. Under normal conditions the LCD shall display a "SYSTEM IS NORMAL" message and the current time and date.
   d. Should an abnormal condition be detected the appropriate LED (Alarm, Supervisory or Trouble) shall flash. The unit audible signal shall pulse for alarm conditions and sound steady for trouble and supervisory conditions.
   e. The LCD shall display the following information relative to the abnormal condition of a point in the system:
      i. 40 character custom location label.
      ii. Type of device (e.g., smoke, pull station, waterflow
      iii. Point status (e.g., alarm, trouble).
   f. Operator keys shall be key switch enabled to prevent unauthorized use. The key shall only be removable in the disabled position. Acknowledge, Silence and Reset operation shall be the same as the FACP.
9. Emergency Power Supply
   a. General: Components include battery and charger as needed.
   b. Battery: Sealed maintenance free. Provide sufficient capacity to operate the complete alarm system in normal or supervisory (non-alarm) mode for a period of 24 hours. Following this period of operation on battery power, the battery shall have sufficient capacity to operate all components of the system, including all alarm notification devices in alarm mode for a period of 15 minutes.

O. INSTALLATION

1. General:
   a. Install system components and all associated devices in accordance with applicable NFPA Standards and manufacturer's recommendations.
   b. Installation personnel shall be supervised by persons who are qualified and experienced in the installation, inspection, and testing of fire alarm systems. Examples of qualified personnel shall include, but not be limited to, the following:
   c. Factory trained and certified personnel.
   d. National Institute of Certification in Engineering Technologies (NICET) fire alarm level II certified personnel.
   e. Personnel licensed or certified by state or local authority.
2. Equipment
   a. Furnish and install a complete Fire Alarm System as described herein and as shown on the plans. Include sufficient control unit(s), annunciator(s), manual stations, automatic fire detectors, smoke detectors, audible and visible notification appliances, wiring, terminations, electrical boxes, Ethernet drops, and all other necessary material for a complete operating system.
   b. Fire Alarm Equipment shall be maintained fully operational until the new equipment has been tested and accepted.
   c. Equipment Removal: After acceptance of the new fire alarm system, disconnect and remove the fire alarm equipment and restore damaged surfaces. Package operational fire alarm and detection equipment that has been removed and deliver to the Owner.
   d. Water-Flow and Valve Supervisory Switches - where applicable: Connect for each sprinkler valve required to be supervised.
   e. Device Location-Indicating Lights: Locate in the public space immediately adjacent to the device they monitor.
   f. Install manual station with operating handle 48 inches (1.22 m) above floor. Install wall mounted audible and visual notification appliances not less than 80 inches (2.03 m) above floor to bottom of lens and not greater than 96 inches (2.44 m) above floor to bottom of lens.
   g. Mount outlet box for electric door holder to withstand 80 pounds pulling force.
   h. Automatic Detector Installation: Conform to NFPA 72.
   i. Ethernet Drop: A standard RJ-45 Ethernet connection to the owner’s Ethernet network shall be provided at each fire alarm control unit.
3. Preparation:
   a. Coordinate work of this Section with other affected work and construction schedule.
4. Connections
   a. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Division 08 Section "Door Hardware." Connect hardware and devices to fire-alarm system.
   b. Verify that hardware and devices are NRTL listed for use with fire-alarm system in this Section before making connections.
   c. Make addressable connections with a supervised interface device to the following devices and systems.
      i. Install the interface device less than 3 feet (1 m) from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
      ii. Smoke dampers in air ducts of designated air-conditioning duct systems.

iii. Alarm-initiating connection to elevator recall system and components.
iv. Supervisory connections at valve supervisory switches – where applicable.
v. Supervisory connections at low-air-pressure switch of each dry-pipe sprinkler system – where applicable.

5. Wiring Installation
   a. System Wiring: Wire and cable shall be a type listed for its intended use by an approval agency acceptable to the Authority Having Jurisdiction and shall be installed in accordance with the appropriate articles from the current approved edition of NFPA 70: National Electric Code (NEC).
   b. Contractor shall obtain from the Fire Alarm System Manufacturer written instruction regarding the appropriate wire/cable to be used for this installation. No deviation from the written instruction shall be made by the Contractor without the prior written approval of the Fire Alarm System Manufacturer.
   c. Color Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color code for alarm initiating device circuits wiring and a different color code for supervisory circuits. Color-code notification appliance circuits differently from alarm-initiating circuits. Paint fire alarm system junction boxes and covers red.
   d. Terminate circuit in control unit for Class "A" supervision. For Class “B” NAC’s, mount end-of-line device in a common box with other EOL resistors and label circuit number and panel.
   e. Ethernet Circuits:
   f. Ethernet circuits shall be provided to the Fire Alarm Control Unit as shown on the plans.
   g. Where a dedicated Fire Alarm Ethernet LAN is specified only Agency Listed Fire Alarm Ethernet hardware shall be installed.
   h. The electrical contractor shall coordinate and ensure proper Ethernet connections occur at the fire alarm control unit and other designated equipment locations prior to system turnover.
6. Identification
   a. Identify system components, wiring, cabling, and terminals.
   b. Install framed instructions in a location visible from fire-alarm control unit.
7. Grounding
   a. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.
8. Field Quality Control
   a. Manufacturer's Field Services: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and the pretesting, testing, and adjustment of the system.
   b. Service personnel shall be qualified and experienced in the inspection, testing, and maintenance of fire alarm systems. Examples of qualified personnel shall be permitted to include, but shall not be limited to, individuals with the following qualifications:
      i. Factory trained and certified.
      ii. National Institute for Certification in Engineering Technologies (NICET) fire alarm certified.
      iii. International Municipal Signal Association (IMSA) fire alarm certified.
      iv. Certified by a state or local authority.

v. Trained and qualified personnel employed by an organization listed by a national testing laboratory for the servicing of fire alarm systems.

c. Pretesting: Determine, through pretesting, the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new and retest until satisfactory performance and conditions are achieved.

d. Inspection:
   i. Inspect equipment installation, interconnection with system devices, mounting locations, and mounting methods.
   ii. Verify that units and controls are properly installed, connected, and labeled and that interconnecting wires and terminals are identified.

e. Acceptance Operational Tests:
   i. Perform operational system tests to verify conformance with specifications:
      - Each alarm initiating device installed shall be operationally tested. Each device shall be tested for alarm and trouble conditions. Contractor shall submit a written certification that the Fire Alarm System installation is complete including all punch-list items. Test battery operated emergency power supply. Test emergency power supply to minimum durations specified. Test Supervising Station Signal Transmitter. Coordinate testing with Supervising Station monitoring firm/entity.
   ii. Test each Notification Appliance installed for proper operation. Submit written report indicating sound pressure levels at specified distances.
   iii. Test Fire Alarm Control Unit.
   iv. Provide minimum 10 days' notice of acceptance test performance schedule to Owner, and local Authority Having Jurisdiction.
   v. Retesting: Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system test that the total system meets the Specifications and complies with applicable standards.
   vi. Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log. Use NFPA 72 Forms for documentation.
   vii. Final Test, Record of Completion, and Certificate of Occupancy:
      - Test the system as required by the Authority Having Jurisdiction in order to obtain a certificate of occupancy. Provide completed NFPA 72 Record of Completion form to Owner and AHJ.

f. Demonstration
   i. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

g. Cleaning & Adjusting
   i. Cleaning: Remove paint splatters and other spots, dirt, and debris. Clean unit internally using methods and materials recommended by manufacturer.
   ii. Occupancy Adjustments: When requested within one year of date of Substantial Completion, provide four (8) hour technician visits for on-site assistance in adjusting device address wording, voice sound pressure levels and adjusting controls and sensitivities and to suit actual occupied conditions.

h. Training
   i. Provide the services of a factory-authorized service representative to demonstrate the system and train Owner's maintenance personnel as specified below.

ii. Train Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventive maintaining of the system. Provide a minimum of 8 hours' training.

Schedule training with the Owner at least seven days in advance.

R. MONITORING REQUIREMENTS

Radio alarm transmittertransmitter shall comply with NFPA1221 and shall be listed and labeled by an nrtl. Furnish and install AES Corporation model number 7788F series digital radio masterbox complete with all related antenna and related cabling. The system shall comply wit the City of Worcester Fire Prevention design standards.comply with 47 cfr 90.description: manufacturer's standard commercial product; factory assembled, wired, tested, and ready for installation and operation.packaging: a single, modular, nema 250, type 1 metal enclosure with a tamper-resistant flush tumbler lock.signal transmission mode and frequency: VHF or UHF 2-w power output, coordinated with operating characteristics of the established remote alarm receiving station designated by owner.normal power input: 120-v ac.secondary power: integral-sealed, rechargeable, 12-v battery and charger. Comply with nfpa 72 requirements for battery capacity; submit calculations.antenna: omnidirectional, coaxial half-wave, dipole type with driving point impedance matched to transmitter and antenna cable output impedance. Wind-load strength of antenna and mounting hardware and supports shall withstand 100 mph (160 km/h) with a gust factor of 1.3 without failure.antenna cable: coaxial cable with impedance matched to the transmitter output impedance.

Antenna-Cable Connectors: Weatherproof.

Alarm Interface Devices: Circuit boards, modules, and other auxiliary devices, integral to the transmitter, matching fire-alarm and other system outputs to message-generating inputs of the transmitter that produce required message transmissions.

Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit or from its own internal sensors or controls and shall automatically transmit signal along with a unique code that identifies the transmitting station to the remote alarm receiving station. Transmitted messages shall correspond to standard designations for fire-reporting system to which the signal is being transmitted and shall include separately designated messages in response to the following events or conditions:

Transmitter Low-Battery Condition: Sent when battery voltage is below 85 percent of rated value.

System Test Message: Initiated manually by a test switch within the transmitter cabinet, or automatically at an optionally preselected time, once every 24 hours, with transmission time controlled by a programmed timing device integral to transmitter controls.

Transmitter Trouble Message: Actuated by failure, in excess of one-minute duration, of the transmitter normal power source, derangement of the wiring of the transmitter, or any alarm input interface circuit or device connected to it.

Local Fire-Alarm-System Trouble Message: Initiated by events or conditions that cause a trouble signal to be indicated on the building system.

Local Fire-Alarm-System Alarm Message: Actuated when the building system goes into an alarm state. Identifies device that initiated the alarm.

Local Fire-Alarm-System Supervisory-Alarm Message: Actuated when the building alarm system indicates a supervisory alarm.

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2. Furnish and install a surface mounted fire fighters key box and remote exterior beacon. Coordinate with the City of Worcester to obtain the necessary application and preferred equipment location.

PART 3 - EXECUTION

3.19 INSPECTION AND COORDINATION

A. This Contractor shall inspect surfaces and areas that will receive his material and the job conditions as they exist and report any conditions that may adversely affect his work. Notify Architect or General Contractor of unsuitable conditions.

B. Coordinate work with construction schedule and job progress.

C. This Contractor shall confer with the General Contractor and other Trades to coordinate his work and to properly locate systems to avoid conflict and interference.

D. Any interference with the work of other Trades or with architectural or structural details shall be brought to the attention of the Architect for decision before installation. Contractor's failure to so coordinate his work will not relieve him of the responsibility to correct work to suit building conditions.

3.20 INSTALLATION

A. Installation shall be by skilled workmen using proper equipment. Commencement of work shall be deemed as acceptance of existing conditions by installer.

B. Entire application shall be in strict accordance with manufacturer's recommendations and the standards of the National Electrical Code, local codes and ordinances, OSHA safety codes and regulations.

C. After wires are pulled in and all fixtures are installed, this Contractor shall make tests for performance, grounds, etc., and shall immediately remedy defects. Equipment for tests shall be borne by this Contractor.

D. Work under this Contract must be so performed that the progress of the entire project, including work of all Trades shall not cause delays or interference. Material and apparatus shall be installed as fast as condition of the building will permit.

3.21 RACEWAYS AND FITTINGS

A. Conduit and wiring shall be installed concealed in the construction where possible. Conduit shall be installed in a neat, workmanlike manner and run parallel to building walls. Conduit size shall be minimum 3/4".

B. During building construction ends of conduit shall be tightly plugged to exclude plaster, dirt, dust and moisture.

C. Ends of conduit entering boxes shall be equipped with galvanized locknuts and bushings. Cut ends of conduit shall be reamed free of burrs and sharp edges.

D. Electrical metallic tubing couplings and terminations in outlet boxes, junction boxes, panelboard cabinets, etc., shall be secured thereto for grounding by means of raintight and concrete-tight fittings of the interlocking compression ring or stainless steel, multiple joint locking type. Set screws or indentations will not be acceptable as a method of attachment of fittings to conduit or EMT.

3.22 WIRING

A. Joints in wiring shall be made with approved type solderless connectors.

B. All branch circuits shall have separate neutrals and grounds.

3.23 WIRE

A. Wire #8 and larger shall be stranded and no wire less than #12 shall be used, unless otherwise noted.

B. This Contractor may use MC cable with THHN conductors where allowed by code. No wiring less than #12 AWG shall be used.

C. NM Type cable shall NOT be used.

3.24 GROUNDING SYSTEM

A. Framework of motor apparatus, panels, heating equipment, portable equipment, etc., shall be grounded by a ground loop or buss to receive a building ground connection. This Contractor shall install grounding lugs for HVAC equipment ground.

B. No ground wire shall be spliced, except as approved; where necessary to tap or splice a ground wire cable or loop, Cadweld copper weld splice or tap shall be used. Cable ground connection shall be solderless, non-corrosive, cast lug type. Ground clamps shall be non-corrosive cast brass or bronze.

C. This Contractor shall install a fifth wire to be the ground conductor in feeder runs to meet requirements of the National Electrical Code. See Panel Schedules.

D. Ground fault protection shall be installed for temporary and permanent power to meet OSHA requirements and those of the National Electrical Code.

3.25 OUTLET BOXES

A. Ceiling boxes shall be supported to carry the weight of fixtures which are to be hung.

B. Boxes in poured concrete slab ceilings shall be four (4) inch concrete type as required by slab thickness with complete back plate and support.

C. Outlet boxes shall be provided with only the holes necessary to accommodate the conduits being connected. Boxes shall be furnished with lugs or ears for attachment of covers and/or outlet devices.

3.26 PULL AND JUNCTION BOXES

A. Pull and junction boxes shall be supported to the building structure or floor slab by suitable hangers to meet National Electrical Code.

3.27 WIRING DEVICES

A. Grounded type duplex receptacles shall be used. Provide ground path either by continuous metal conduit or separate conductor.

B. Receptacles with X typical for above counter or special mounting height. Refer to the Architectural Drawings for these locations and details before installation.

3.28 EXIT LIGHTS

A. The exit lights are 120 volt. Wiring shall conform to code. Foot candle requirements shall meet code requirements of five (5) foot candles of light on face of exit. Lamps shall be LED.

3.29 FIRE ALARM SYSTEM

A. Provide and install the system in accordance with the plans and specifications, all applicable codes and the manufacturer's recommendations. All wiring shall be installed in strict accordance with all the provisions of the NEC-Article 760A and C, Power-Limited Fire Protective Signaling Circuits or, if required, may be reclassified as non-power limited and wired in accordance with NEC Article 760A and B. Upon completion, This Contractor shall so certify in writing to the Owner and General Contractor.

B. All junction boxes shall be painted red and labeled "Fire Alarm". Wiring color code shall be maintained throughout the installation.

C. Installation of equipment and devices that pertain to other work in the Contract shall be closely coordinated with the appropriate Contractor.

D. This Contractor shall clean all dirt and debris from the inside and outside of the fire alarm equipment after completion of the installation.

E. The manufacturer's authorized representative shall provide on-site supervision of installation.

F. The completed fire alarm system shall be fully tested in accordance with NFPA-72H by this Contractor in the presence of the Owner's Representative, Engineer and the Local Fire Marshall. Upon completion of a successful test, this Contractor shall certify in writing to the Owner and General Contractor.

G. This Contractor shall warrant the completed fire alarm system wiring and equipment to be free from inherent mechanical and electrical defects for a period of one (1) year from the date of the completed and certified test or from the date of first beneficial use.

H. The equipment manufacturer shall make available to the Owner a maintenance contract proposal to provide a minimum of two (2) inspections and tests per year, in compliance with NFPA-72H guidelines

3.30 INSTRUCTIONS TO OWNER

A. It shall be the responsibility of the Electrical Foreman to instruct the Owner in the function, operation and maintenance of electrical systems and equipment.

3.31 CLEANUP

A. Stains and/or damage to the finish of the building caused by faulty workmanship and/or improper handling of material in regard to installation shall be cleaned or removed and replaced at no cost to the Owner.

B. Panels and like shall be cleaned and left in a neat manner and where required shall be painted if any finished material has been removed.

C. Temporary wiring shall be removed.

D. Lighting fixtures shall be left clean. Lenses shall not be installed until areas are completed and free from dust and dirt. Fixtures with plastic covers shall remain wrapped until areas are free from dust and dirt.

3.32 FIRESTOPPING

A. The Electrical Contractor shall be responsible to fire stop all the raceways and the interior and exterior of all sleeves through which wires penetrate walls, floors or any other penetrations requiring firestopping material under this Section.

3.33 RUBBISH REMOVAL

A. The Subcontractor of this Section shall stockpile and drop daily all wastes and debris at areas designated by the General Contractor. The General Contractor shall remove and dispose daily of all waste and debris in accordance with requirements of Section 01 74 19 – Construction Waste Management and Disposal.

END OF SECTION

SECTION 31 10 00

SITE PREPARATION

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade.

1.02 SCOPE OF WORK

A. Work to be done includes furnishing all labor, materials, equipment and services required to complete all site preparation, erosion control and demolition work indicated on the drawings and as specified herein.

B. The work of this Section includes, but is not limited to, the following:

1. Staking layout, limits of work and extent of grading
2. Protection of existing improvements to remain
3. Construction fencing and gates
4. Tree protection
5. Clearing and grubbing
6. Stripping, stockpiling and disposing of topsoil
7. Saw cutting existing pavement
8. Removing bituminous concrete pavement, concrete pavement, retaining wall and handrails
9. Demolition, removal and legal off-site disposal of all existing above grade and subsurface improvements as indicated on the Drawings

1.03 RELATED WORK

A. Section 312000 Earthwork.
B. Section 321313 Concrete Paving.
C. Section 321200 Bituminous Paving
D. Section 323000 Site Improvements
E. Section 329100 Loam and Planting Preparation

1.04 PERMITS AND CODES

A. All work shall comply with all codes, rules, regulations, laws and ordinances of the City of Worcester, Commonwealth of Massachusetts, and all other authorities having jurisdiction. All work necessary to make site preparation comply with such requirements shall be provided without additional cost to the Owner.

B. The Contractor shall procure and pay for all permits and licenses required for work under this Section.

C. The Contractor shall not close or obstruct any streets, sidewalks, or passageways, unless and until they have been discontinued by the City or unless and until he shall have first secured all necessary municipal or other permits thereof. No material whatsoever shall be placed or stored in streets, or passageways until they have been so discontinued. The Contractor shall conduct his operations to interfere as little as possible with the use ordinarily made of roads, driveways, sidewalks, or other facilities near enough to the work to be affected thereby.

D. Issue submittals in accordance with Division 1. Submittals under this section shall include manufacturer's specifications and installation instructions.

1.05 EXAMINATION OF SITE AND DOCUMENTS

A. It is hereby understood that the Contractor has carefully examined the site and all conditions affecting work under this Section. No claim for additional costs will be allowed because of lack of full knowledge of existing conditions.

B. Plans, surveys, measurements and dimensions, under which the work is to be performed are believed to be correct to the best of the Architect's knowledge, but the Contractor shall have examined them for himself during the bidding period, as no allowance will be made for any errors or inaccuracies that may be found herein.

C. Preparation and Workmanship: Except as otherwise specified, site preparation, demolition work and clean up shall be the work of the Contractor. Any item of work not specifically designed to be accomplished by a particular subcontractor shall be considered work of the Contractor.

D. Traffic: Conduct site clearing and demolition operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction.

E. Protection of Existing Improvements: Provide protection necessary to prevent damage to existing buildings, paving, services and all other improvements indicated to remain in place. Locate and identify existing underground utilities within project limit lines. Provide adequate means of protection of all utilities to remain. The Contractor shall contact “Dig-Safe” at 1-888-344-7233 prior to beginning any excavation work. The Contractor shall be solely responsible for locating all underground utilities prior to the commencement of work. Locations of existing utilities on the site plans are not warranted to show all existing utilities under or above ground. Existing utilities indicated on the site plans are shown only for the convenience of the Owner’s representative.

1. Protect improvements and surfacing on Owner's property.
2. Restore improvements damaged during construction to their original condition, as acceptable to the Owner and any agencies having jurisdiction.

F. Protection of existing Trees and Vegetation: Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking or skinning of roots, skinning or bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, damaging heat from paving equipment, excess foot or vehicular traffic, or parking of vehicles within tree canopy drip lines. Provide temporary guards, fencing or any other necessary precautions to protect trees and vegetation to remain.

1. Water trees and other vegetation via off site supply or other legal methods in the event of a water ban to remain within limits of contract work to maintain their health during the course of construction operations.
2. Repair trees and vegetation indicated to remain that are damaged by construction operations, in a manner acceptable to the Architect. Employ a licensed arborist to repair damage to trees and shrubs.
3. Replace trees and vegetation that cannot be repaired and restored to full-growth status, as determined by a licensed arborist. Trees determined to be removed due to damage caused by the work of this project shall be removed and replaced at the Contractor's expense with a quantity of approved tree species that match the total tree caliper surface area of the removed trees as measured 12-inches above original grade. Damage requiring tree removal (coordinate with grading plan) shall include damage to roots, trunk or branches where protection would have prevented such damage. The extent of damage requiring tree removal shall include any one or more of the following: permanent scaring of tree bark, loss of branches or portions of branches that disfigure the tree character, compaction or material contamination of the root zone, damage to roots beyond excavation payment lines, irreversible decline in tree health due to lack of watering.

G. Dust and Pollution Control: Provide dust control for dust generated by the work of this project. Dampen surface or use other approved method. Comply with pollution control requirements of the Town of Wakefield Board of Health.

H. Salvageable Improvements: Carefully remove items indicated to be salvaged or reused, and store at the site at an approved location for future use. Protect such items from accidental damage, vandalism and theft.

I. Bench Marks: Locate, protect and maintain bench marks, monuments, control points and project engineering reference points.

J. Regulatory controls: All work within this Section must comply with the requirements of all authorities having jurisdiction.

1.06 STAGING AREA

A. Parking of cars shall be on site. No parking is permitted within the right of way of adjacent streets. The Contractor shall submit a plan for his construction staging and equipment storage and parking of construction workers within the limits of work, prior to commencing construction.

B. No parking of cars or stockpiling of construction materials shall be permitted under any trees that are scheduled to remain or be protected.

1.07 DISPOSITION OF EXISTING UTILITIES

A. Active utilities existing on the site shall be carefully protected from damage and relocated or removed or abandoned as required by the work. When an active utility line is exposed during construction, its location and elevation shall be plotted on the record drawings as described in this Section and both Architect and the utility owner notified in writing.

B. Inactive or abandoned utilities encountered during construction operations shall be removed, plugged or capped. The location of such utilities shall be noted on the record drawings and reported in writing to the Architect.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Wound paint shall be standard bituminous product manufactured specifically for paint treating of tree cuts and wounds with a broad-spectrum fungicide incorporated in it.

B. Straw bales shall be dense, securely bound bales of straw. Bales shall be wire bound. Bale should weigh an average of 70 pounds per bale.

C. Wood stakes shall be 1 x 1 inch x 4'-0" oak stakes with tapered points.

D. Silt fence fabric shall be Mirafi 100, Mirafi Envirofence or approved equal.

E. Filter catchments placed under catch basin grates shall be "Silt Sack", manufactured by ACF Environmental, or approved equal, sized as required for individual catch basin grates. Silt fence fabric shall not be used in catch basins.

F. Wire mesh support shall be 14 gauge hog wire fence.

G. Gravel or crushed stone for erosion control measures shall be as specified under Section 310000 - EARTHWORK.

H. Snow fence shall be 4'-0" high, wood slat, wire bound fence held in place by driven steel posts, 10'-0" o.c., driven a minimum of 18 inches into the ground.

PART 3 - EXECUTION

3.01 SITE ENGINEERING/LAYOUT

A. Prior to the start of clearing and excavation operations, lay out and stake the new building, paved areas, limits of cut and fill and work limit lines for the Architect’s review.

B. Promptly upon completion of layout work, and before any clearing or other construction work is begun, the Contractor shall arrange a conference on the site with the Architect to review the limits of work areas staked out. The limit of cut and fill shall be clearly marked to determine the extents of tree removal required.

3.02 TREE PROTECTION

A. Prior to starting any construction work, erect tree protection in accordance with the Detail where shown and as directed by the Architect in the field.

B. Within the limit of work, protect all plant materials to remain. No such plant materials shall be used as guys or other fastenings. No material storage, vehicle parking or access routes shall occur under the dripline of trees to remain except where work is specifically shown on the Drawings.

C. The Contractor shall not cause any damage to trees to remain. If the limits of excavation defined by the Contract Documents require removal of roots of trees to remain, such roots (coordinate feasibility with grading plan) shall be neatly cut after consulting with an Arborist and notifying the Architect.

3.03 TEMPORARY CONSTRUCTION FENCE

A. Review layout for temporary construction fencing with the Owner prior to installation of the construction fence. Coordinate gate locations and lock system with the Owner and Worcester Police and Fire Departments.
B. The Contractor shall install safety signage for the perimeter construction fence and
C. "CLOSED FOR CONSTRUCTION" or similar signage on construction fence at all points where the fencing abuts pathways and driveways.
D. Relocate temporary construction fencing as required to perform the work and to maintain unobstructed access through the Owner-occupied portion of the site.
E. Remove temporary construction fence and associated footings and hardware only after the work has been accepted, including landscape establishment.

3.04 CLEARING AND GRUBBING

A. After the Landscape Architect has reviewed the limit of clearing, remove trees and shrubs as indicated on the Drawings to construct the work of this project.
B. Grubbing: Completely remove stumps and roots of vegetation indicated to be removed.
C. All materials from clearing operations shall be removed from the site prior to or by the end of the clearing operations. On-site disposal will not be allowed.
D. Fill holes, depressions caused by clearing and grubbing operations with fill material and placement conforming to Section 312000 EARTH MOVING as specified for the proposed improvements. Place fill in horizontal layers, 6 inches in loose depth, and compact to the specified density.
E. Without exception, any area cleared for any reason by the Contractor, inside or outside the Limit of Work Line and not otherwise developed shall be loamed and seeded at no additional cost to the Owner.
F. Tree clearing shall include as many separate mobilizations by the Contractor's sequence of operations due to the phased nature of the project. A selective clearing operation shall be performed by the Contractor after rough grading has been completed, to remove trees, stumps and vegetation at the limits of cuts and fills as directed by the Architect in the field.

3.05 STRIPPING AND DISPOSING OF TOPSOIL

A. Prior to the start of General Excavation, strip all topsoil and subsoil from within areas to be re-graded, disposing of stripped material in accordance with applicable regulations. Do not commence the stripping operation without a clear understanding of the existing soil depths, planting and site conditions to be preserved and limits of topsoil stockpile and stripped areas.
B. All topsoil encountered during the stripping operations, regardless of depth, shall be removed and stockpiled for re-use onsite. Refer to Section 319100 Loam and Planting Preparation for information regarding the existing topsoil and requirements for new planting soils. Areas having greater depths of topsoil than indicated on boring data sheets or reasonably anticipated shall be stripped of all such material and fill shall be used to bring such areas to the rough grade level. Stones over six inches and tree roots over two inches in any dimension shall be removed from loam before stockpiling. Stripped soil that can be classified as fill as defined in Section 312000 – EARTH MOVING, shall be stockpiled for reuse in rough grading. This material shall be stripped separately from the topsoil.
C. The Contractor shall control the stripping operation so that the topsoil does not become contaminated with subsoil or other earth materials. The Contractor shall use machinery suitable for achieving this result.
D. Subsoil: The material directly below the topsoil indicated on the test pit logs as
E. "subsoil" shall not be considered usable as Ordinary Fill as specified in Section 312000 – EARTH MOVING or for topsoil. The only area where subsoil may be used is under areas with new landscape planting. Subsoil shall be stripped separately from the topsoil and from the underlying earth materials.

3.06 BITUMINOUS CONCRETE

A. Remove and legally dispose of all bituminous concrete paving indicated on the Drawings to be removed and all other paving required to be removed in order to construct the Project.
B. Saw cut existing bituminous paving at all locations where pavement to be removed or pulverized meets existing pavement to remain and where new pavement meets existing pavement to remain. Sawcuts shall be made with sharp tools and blades to provide a clean, straight and vertical cut line. Use carbide or other type blade intended for the purpose.
C. Reclaimed Base Course – Pulverize and Blend: In existing bituminous paved areas that will be paved with new bituminous concrete as part of the work of this project, the existing bituminous pavement shall be uniformly crushed, pulverized and blended with the underlying gravel base.

1. The final mixture (asphalt surface and aggregate base course material) shall be pulverized such that the resulting material will be free from excessive fine material.

- 100% passes the 3-inch (75mm) sieve.
- 95% passes the 2-inch (50mm) sieve.
- 55% passes the Number-4 (4.75mm) sieve.
- Material passing the Number-200 sieve not to exceed 8% by weight.

2. Prior to pulverizing the existing pavement, the Contractor shall locate and protect existing utility structures and underground pipes, culverts, conduits and other appurtenances to remain. If the upper sections of utilities are removed to facilitate pulverizing the existing pavement, the remaining part of the structure designated to remain shall be immediately covered with a steel plate capable of withstanding a 36.5 ton truckload with impact.

3. The Contractor shall submit to the Architect for approval a description of equipment and the process to be used for pulverizing and blending the existing pavement (Full-Depth Reclamation).
4. Full-depth reclamation (FDR) shall consist of uniformly crushing, pulverizing and mixing existing asphalt pavement and the underlying base course material to depths as shown in the drawings. This work shall conform to The Commonwealth of Massachusetts Department of Transportation, Standard Specifications for Highways and Bridges, latest edition Section 403 Reclaimed Base Course.
5. The material produced shall be a homogeneous mass that is able to be placed, compacted and cured; and conformed to the lines, grades, thickness and typical cross sections as shown in documents.
6. FDR shall consist of the existing asphalt pavement and existing base course material. The base course material shall not contain roots, clay, bricks, topsoil or deleterious material.
7. No more than 50% of the final mixture shall be made of the existing asphalt pavement unless approved by the engineer or Owner.
8. Reclamation shall be accomplished by means of self-propelled, traveling rotary reclaimer or equivalent machine capable of cutting through existing asphalt pavement to depths up to 12-inches in one pass. Existing asphalt pavement and underlying aggregate base course material must be pulverized and mixed to form a homogeneous mass. The Contractor shall submit a description of the equipment and process to be used for pulverizing and blending the existing pavement.
9. FDR processing shall not commence during frozen or saturated conditions. Moisture in the base course material shall be within +/-2% of the optimal moisture content for the processed material.

3.06 ABOVE AND BELOW GRADE IMPROVEMENTS

A. Remove and legally dispose of all existing above and below grade improvements necessary to allow construction of all work of this Contract including but not limited to retaining walls and associated foundations, concrete slabs, railings, signs, pavement and any and all other improvements inside or outside the contract limits. Remove walls, footings, and other obstructions to a depth of at least 2 feet below finished grades to construct the subsurface improvements of this project.

3.07 DISPOSAL OF WASTE MATERIALS

A. Removal from Owner's property: Remove all waste materials from Owner's property in timely and responsible manner and legally dispose of off-site. Accumulation is not permitted. Maintain disposal routes clear, clean and free of debris. Dumping and / or burning of material on site will not be permitted.

3.08 CLEAN UP

A. Keep pavements and areas adjacent to and leading from the site, clean and free of mud, dirt and debris.

B. At completion of the work of this Section, remove materials generated by site clearing. Do not spill or disperse debris on the site. Leave the site in a safe and clean condition acceptable to the Architect.

END OF SECTION

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SECTION 31 20 00

EARTH MOVING

PART 1 – GENERAL

1.01 GENERAL PROVISIONS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 - General Requirements, apply to the Work of this Section.

1.02 SPECIAL INSTRUCTIONS

A. The General Contractor shall become familiar with other Sections of the Specifications to determine the type and extent of work there under which affects the work of this section whether, or not such work is specifically mentioned.

1.03 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:

1. Material excavated for removal from site from the sub grade datum line (level) and bottom of excavation deemed to be unsuitable materials will be subject to payment as a UNIT PRICE. These materials include but not limited to: Unsuitable soils, existing fill, surficial and buried organic soil, shall be removed from the building footprint and under footings of retaining walls, utilities, utility structures, stairs, and ramps. After the unsuitable materials are removed below the sub grade level, the grades shall be restored to the bottom of footings and slabs using Structural Fill. Payment for this work will be by the cubic yard measured in place as described under specification section UNIT PRICES.
2. Once the G.C. completes excavations and reaches the sub grade datum (level) as defined in the Geotechical report and the drawings and the Architect, Architect's Geotechnical Engineer and or Geo Environmental Engineer shall observes this excavation. Upon observations and discovery of unsuitable soils at this sub grade datum (level), the G.C. shall conduct a Survey at this elevation by G.C. Furthermore, upon instruction to continue excavation to remove the unsuitable materials by Architect, Architect's Geotechnical Engineer and or Geo Environmental Engineer, another survey shall be conduct at the time the unsuitable materials are removed below sub grade Datum (level). The material removed within these two data (level) points will be subject to payment as a UNIT PRICE.

B. The subgrade of the proposed paved areas shall be improved as described in Item 3.1A of these specifications.

1. All materials, equipment, labor and services required for all Earth Moving work, including all items incidental thereto, as specified herein and as shown on the Drawings:
2. All excavated soils shall be removed from the site and disposed of. No burning on the site shall be permitted.
3. Excavating and backfilling required for the installation of the building slab and footings, pavements, underground utilities including storm drainage, sanitary, electrical and water.

4. Pumping and/or bailing necessary to maintain excavated spaces free from water from any source whatsoever.
5. The Work of this Section shall include performance of pre and post blasting surveys, preparation of a blast design plan and analysis, and provision of all services in accordance with requirements of 527 CMR 13.00 Explosives and the Contract Documents, for all existing building structures and utilities located within 500 feet of the Limit of Work Line (LOW) as indicated on the Drawings. The General Contractor shall coordinate with the Fire Department to provide fire watch services before, during, and after all blasting performed under the Contract, in accordance with requirements of 527 CMR 13.00 Explosives and the Contract Documents.
6. Preparation, submission of, and compliance with an approved, phased erosion control plan in accordance with DEP requirements for a SWPPP (Stormwater Pollution Prevention Plan) to include materials and measures required to control soil erosion resulting from construction operations for the duration of the project.
7. Designation of an Erosion Control Supervisor and submission of weekly erosion control reports
8. Coordination with Archaeological Monitor.
9. Sediment removal and disposal
10. Maintenance of erosion control device
11. Removal of erosion control devices
12. Install fencing and safety devices or controls as specified and as necessary.
13. Dust control and clean up.

1.04 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements that affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this section include, but are not limited to, the following Sections:
1. Section 31 10 00 - Site Clearing
2. Section 31 21 00 - Site Preparation
3. Section 31 21 01 - Site Utilities Preparation
4. Section 32 25 00 - Erosion & Sedimentation Controls
5. Section 33 10 00 - Water Utilities
6. Section 33 30 00 - Sanitary Sewer Utilities
7. Section 33 40 00 - Storm Drainage Utilities

1.05 REFERENCE SPECIFICATIONS

A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements govern.
1. American Society for Testing and Materials (ASTM):
a. ASTM C136, Sieve Analysis of Fine and Coarse Aggregates.
b. ASTM D1556, Density of Soil In Place by the Sand-Cone Method

c. ASTM D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbs/ft.^{3} (2,700 kN-m/m^3)).
d. ASTM D6938, Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
e. ASTM D422, Particle Size Analysis of Soils.
f. ASTM D2487, Standard Test Method for Classification of Soils for Engineering Purposes.

2. Commonwealth of Massachusetts:
   a. Massachusetts Highway Department, "Standard Specifications for Highways and Bridges" (S.S.H.B.) latest edition.
   b. Commonwealth of Massachusetts State Building Code.
3. American Association of State Highway and Transportation Officials (AASHTO):
   a. AASHTO T-11, Standard Method of Test for amount of material finer than 0.075 mm sieve in aggregate.
   b. AASHTO T-27, Standard Method of Test for sieve analysis of fine and coarse aggregates.
4. Occupational Safety and Health Act (OSHA) of 1970 (Public Law 91-596 of the United States, 29 USC Section 651 et seq.).
5. Geotechnical Reports:
   a. Lincoln Elementary School, by Lahlaf Geotechnical Consulting, Inc. dated September 6, 2024.
   b. Thorndyke Road Elementary School by Lahlaf Geotechnical Consulting, Inc. dated September 6, 2024.

1.06 BENCH MARKS AND ENGINEERING

A. Lines and grade work in accordance with Drawings and Specifications shall be laid out by a registered Civil Engineer or Surveyor employed by the General Contractor. The General Contractor shall establish permanent benchmarks, to which access can easily be had during the progress of the work. The General Contractor shall maintain all established bounds and benchmarks and replace, as directed, any which may be disturbed or destroyed. The selection of the registered Civil Engineer or Surveyor shall be subject to the Architect's approval. The General Contractor shall pay all costs of the services of the Civil Engineer or Surveyor.

B. The General Contractor shall verify dimensions and elevations on the ground and report any discrepancies immediately to the Architect. Any discrepancies not reported prior to construction shall not be the basis for claims for extra compensation.

C. The General Contractor shall use GPS (Global Positioning System) to locate all horizontal and vertical data shown on the CAD drawings for all proposed site work.

D. Do not commence any excavation or construction work until verification of the layout performed by the Engineer/Surveyor has been received and approved by the Architect.

1.07 SOIL REPORT

A. Geotechnical Engineering Report for the Proposed dated, prepared by LGCI; 100 Chelmsford Road, Suite 2, Billerica, MA 01862 is attached hereto, and hereby made a part of the Contract Documents.

B. The Owner assumes no responsibility for the General Contractor's failure to make his own site investigation and makes no representation other than the soils reports regarding the character of the soil or subsurface conditions which may be encountered during the performance of the work. The General Contractor shall refer to Section 31 09 00 - Subsurface Investigation, and attached soil Reports. Failure by the General Contractor to be aware of existing site conditions shall not be cause for additional cost to the Owner.

C. Information on subsurface conditions is made available for the convenience of the Bidders. The Owner does not represent to the General Contractor that the information is either an accurate or a comprehensive indication of subsurface conditions. Bidders are invited to review the information to apprise themselves of the information available, and also to make additional investigations at their own expense.

D. No claim for extra cost or extension of time resulting from reliance by the General Contractor on information presented herein shall be allowed, except as provided in the Contract Documents.

1.08 QUALITY ASSURANCE

A. The Owner may retain and pay for the services of an independent testing agency (Soils Representative) to monitor backfill operations, perform laboratory tests on soil samples, and to perform field density tests; and a Geotechnical Engineer to periodically observe the earthwork operations, observe the preparation of the subgrade for footings, slabs, and paved areas, and to review laboratory and field test data. The geotechnical engineer may from time to time request that the contractor excavate tests pits ahead of excavation to confirm subsurface conditions. Test pits shall be performed at no additional cost to the Owner.

B. The Engineer's duties do not include the supervision or direction of the actual work by the Contractor, his employees or agents. Neither the presence of the Engineer nor any observation and testing by the Engineer shall excuse the contractor from defects discovered in his Work at that time or subsequent to the testing.

C. Subgrades shall be observed and approved by the geotechnical engineer before placing fill. The compaction and material composition shall be approved by the geotechnical engineer before placement. The by the Architect, and/or Geotechnical Engineer prior to placing subsequent lifts. If inspections indicate subgrade does not meet specified requirements, the unsuitable subgrade shall be excavated, the unsuitable material shall be removed, and replaced with approved backfill material and compacted at no additional cost to the owner or architect. The work shall be done in accordance with this specification.

D. Costs related to retesting due to unacceptable quality of work and failures discovered by testing shall be paid for by the Contractor at no additional expense to Owner, and the costs thereof will be deducted by the Owner from the Contract Sum.

1. The Soils Representative's presence or the Geotechnical Engineer does not include supervision or direction of the actual work by the Contractor, his employees or agents. Neither the presence of the Soils Representative, nor any observations and testing performed by him, nor any notice or failure to give notice shall excuse the Contractor from defects discovered in his work.
2. The Owner reserves the right to modify the services of the Soils Representative or Geotechnical engineer.

E. The contractor shall make provisions for allowing safe and timely observations and testing of Contractor's Work by the Geotechnical Engineer and by the Soils Representative. The presence of the independent testing agency and/or the Geotechnical Engineer does not include supervision or direction of the actual work of the Contractor, his employees or agents. Neither the presence of the Soils Representative and/or the Geotechnical Engineer, nor any observations and testing performed by them, nor failure to give notice of defects shall excuse the Contractor from defects discovered in his work.

F. Pre-excavation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1. Before commencing earthwork, meet with representatives of the governing authorities, Owner, Architect, Engineer, consultants, Soils Representative, and other concerned entities. Review earthwork procedures and responsibilities including testing and inspection procedures and requirements. Notify participants at least 3 working days prior to convening conference. Record discussions and agreements and furnish a copy to each participant.

G. Testing: Compaction tests will be required by the Owner and will be paid for by the owner. No specific testing schedule has been established at this time. If tests indicate that density requirement have not been achieved, the contractor continue compacting the tested material. All retesting is these areas shall be paid for by the contractor.

H. The Owner's Testing Agency will perform water content, gradation tests on onsite and processed materials, and compaction tests at a frequency and at locations as required. The results of these tests will be submitted to the Architect, and a copy submitted to the Contractor, on a timely basis so that the Contractor can take such action as is required to remedy the indicated deficiencies.

I. Contractor shall notify Architect when excavations have reached required subgrade and provide a minimum notice of 24 hours prior to placement of backfill on exposed subgrade. Density and Compaction Testing: The contractor is responsible to schedule compaction tests and allow adequate time for the proper execution of said tests. **This section also applies to instances when the General Contractor resumes earthwork operations after a period of pause in earthwork operations that require observations by the Geotechnical Engineer.**

1.09 PHASE I-ENVIRONMENTAL SITE ASSESSMENT

A. The Phase I-Environmental Site Assessment prepared by Lord Associates, Inc. 1506 Providence Highway, Suite 30, Norwood, MA 02062 is attached hereto, and hereby made a part of the Contract Documents.

B. The Owner assumes no responsibility for the General Contractor failure to make his own site investigation and makes no representation other than the soils reports and site assessment regarding the character of the soil or subsurface conditions which may be encountered during the performance of the work. Failure by the General Contractor to be aware of existing site conditions shall not be cause for additional cost to the Owner.

C. Information on subsurface conditions is made available for the convenience of the Bidders. The Owner does not represent to the General Contractor that the information is either an accurate or a comprehensive indication of subsurface conditions. Bidders are invited to review the information to apprise themselves of the information available, and also to make additional investigations at their own expense.

D. No claim for extra cost or extension of time resulting from reliance by the General Contractor on information presented herein shall be allowed, except as provided in the Contract Documents.

1.10 PROTECTION

A. All rules and regulations governing the respective utilities shall be observed in executing all work under this Section.

B. All work shall be executed in such a manner as to prevent any damage to existing streets, curbs, paving, service utility lines, structures and adjoining property. Monuments and bench marks shall be carefully maintained and, if disturbed or destroyed and replaced.

1.11 DEFINITIONS

A. SSHB: “Standard Specification for Highways and Bridges”, Commonwealth of Massachusetts, Massachusetts Highway

B. Department, latest edition, including supplements.

C. The words "finished grades" as used herein mean the required final grade elevations indicated on the Drawings and defined in this specification section. Where not otherwise indicated, areas outside of buildings shall be given uniform slopes between points, for which finished grades are shown, or between such points and existing grade except that vertical curves or roundings shall be provided at abrupt changes in slope.

D. Excavation: Removal of material encountered to subgrade elevations indicated and subsequent disposal of materials removed. See EXECUTION section for directions for treatment of excavations in rock.

E. Unauthorized Excavation: Removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Architect. Unauthorized excavation, as well as remedial work directed by the Architect, shall be at the Contractor's expense. See EXECUTION section for instructions for treatment of unauthorized excavation.

F. Additional Excavation: Excavation required beyond anticipated subgrade elevation. See EXECUTION section for procedures.

G. Natural Subgrade: The undisturbed, inorganic native soil exposed below site fill and disturbed native soils at footing and/or structural fill bearing elevations; or Rock at least 12" below the footing bearing elevation, slabs on grade, or utilities.

H. Structure: Buildings, foundations, slabs, tanks, curbs, or other man made stationary features occurring above or below ground surface.

I. Structural Fill: Imported or approved on site aggregate or select soil meeting the physical properties described in Section 2.1 MATERIALS, and compacted in place to form a supportive bearing surface.

J. Unsuitable material: On-site materials which are of improper gradation to allow adequate compaction, and/or defined as organically contaminated (including roots), uncontrolled fill material, disturbed native material, or otherwise identified as improper for the intended use by the Architect. Refer to the Supplemental info section of the Geotechnical Engineering Report.

K. Rock: All materials which, in the opinion of the Architect, require blasting or special impact tools such as jack hammers, sledges, chisels or devices similar in purpose which are designed for use in cutting or breaking materials that have compressive strengths in excess of 300 pounds per square inch in their natural states. Boulders larger than 2 cubic yards in volume are classified as Rock.

L. Common Borrow: See MATERIALS Section.

M. Structural Fill: See MATERIALS Section.

N. Bedding Fill for Pipe and Other Utility Structures: See MATERIALS Section.

O. Bedding Fill for Gravity Sewers: See MATERIALS Section.

P. Gravel Base Course for Paved Areas: See MATERIALS Section.

Q. Trenching Fill: See MATERIALS Section.

R. Loam Borrow: See MATERIALS Section.

S. Filter Fabric: See MATERIALS Section.

T. Vapor Retarder: See MATERIALS Section.

1.12 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures in accordance with requirements of the Contract Documents.

1. Submit a detailed earthwork sequence plan for project excavation indicating temporary stockpile areas and procedures for subgrade protection

B. Submit a dewatering plan for review by the Architect at least two weeks before the start of construction. Dewatering and groundwater control systems shall be designed to keep excavations free of water and to avoid disturbance of the subgrade.

C. Excavation and Excavation Support Plan: Submit at least 10 calendar days prior to the start of the work a detailed plan for the sequence of excavation, and methods to be used to shore roadways and sidewalks.

D. Obtain required permits for discharge of dewatering effluent. Submit two copies of all permits obtained at least one week prior to system installation.

E. The contractor shall submit 50-lbs samples of each type of fill material, in air-tight containers, proposed for use on-site in accordance with PART 2 - PRODUCTS, to the Owner's Geotechnical Engineer (Geotechnical Consultant) for preliminary compliance testing at least two (2) weeks prior to use. No filled material shall be delivered to the site or placed until the material has been approved. The final review of the material will be based on the re-tested sample by the owner's testing agency upon delivery of the material to the site. The gradation curves shall fit entirely within the envelopes defined by the limits specified herein for the material to be approved for use at the site.

1. Samples shall be delivered to the office of the Architect or as directed.
2. Samples required in connection with compaction tests will be taken and transported by the Soils Representative.
3. Additional tests, including grain-size analyses and laboratory compaction tests shall be performed on the material after it is delivered to the site.
4. For on-site materials, submit representative samples, collected from each stockpile of excavated on-site material to be used, directly to the Owner's Geotechnical Consultant's office at least two (2) weeks in advance of use of these materials.

F. Submit representative samples of approved equivalent materials, such as Filter Fabric, for approval prior to delivery to the site.

G. Submit gradations from suppliers of crushed stone for pipe bedding, structure bedding, and infiltration system encasement and bedding.

1.13 EXAMINATION OF SITE AND DOCUMENTS

A. It is hereby understood that the General Contractor has carefully examined the site and all conditions affecting work under this Section. No claim for additional costs shall be allowed because of a lack of knowledge of existing conditions as indicated in the Contract Documents, or obvious from observation of the site.

B. Plans, surveys, measurements, and dimensions under which the work is to be performed are believed to be correct, but the General Contractor shall have examined them for himself during the bidding period and formed his own conclusions as to the full requirements of the work involved.

1.14 PROJECT COORDINATION

A. Prior to start of earthwork, the General Contractor shall arrange an onsite meeting with the Architect and the Geotechnical Engineer for the purpose of establishing the General Contractor's schedule of operations, and scheduling observation and requirements. The Geotechnical Engineer may from time to time request that the General Contractor excavate test pits ahead of excavation to confirm subsurface conditions at no additional cost to the Owner.

B. Protect all benchmarks, monuments, and property boundary pins. Replace if destroyed by General Contractor's operation.

1.15 PROJECT CONDITIONS

A. "GEOTECHNICAL ENGINEERING REPORT"

1. The geotechnical engineering report prepared for this site (which includes subsurface exploration data and an exploration location plan) referenced in this section is included in the Supplemental information section and is made available for the convenience and information to the Contractor only. It is expressly understood that the Owner will not be responsible for any interpretation, conclusions or generalizations made by the contractor based on the contractor's review of the report.
2. Bedrock could be encountered within planned excavation depths for construction of ponds, parking areas, deeper utilities or elevator pits. In general, bedrock excavation is anticipated to be practical via ripping or hoe-ramming; extensive blasting is not anticipated as part of the work.

B. Do not proceed with utility interruptions without Architect's written permission.

C. Contact utility-locator service for area where Project is located before excavating.

D. Protect nearby structures from damage. All construction induced damage shall be repaired by the General Contractor at no additional expense to the Owner.

E. The General Contractor shall obtain and pay for all permits and licenses required to complete the work of this Section.

F. In case of conflict between regulations or between regulations and Specifications, the General Contractor shall comply with the strictest applicable codes, regulations, or Specifications at no additional cost to the owner.

G. The General Contractor may perform additional test borings and other explorations at no cost to the Owner.

1.16 SEQUENCING AND SCHEDULING

A. As construction proceeds, notify the Architect prior to the start of earthwork operations which require observations and testing. A minimum of 72 hours notification shall be provided for work that requires observation or testing

1.17 AS BUILT SURVEY

A. At the completion of the specified work, a field survey shall be performed by a surveyor registered in Massachusetts of the as built building, ground elevations (spot elevations 50' on center and at ledges of pavement and or curbing, top and bottom of walls and utility structures, floor elevations, utilities, fencing, walls and all site improvements, limit-of- work line, property lines, and tree line within the limit of work. The surveyed information shall be presented in a CAD format and submitted to the Architect in the format of a CD with PDFS at a scale of 1"=30'.

B. All field survey work and presentative of the surveyed information shall be completed and submitted to the Architect within four weeks of completion of the construction as specified and as shown on the drawings.

1.18 UNIT PRICES

A. The base bid shall include the excavating and disposing of excavated material generated within the limit of work and specified down to the subgrades grades shown on the drawings or specified herein. Unit pricing will be subject to materials excavated below sub grade as instructed to be removed by the Architect, Architect's Geotechnical Engineer and or Geo Environmental Engineer and quantified via survey by the G.C.

1. Lincoln Elementary School:
   a. Unit Price No. 1: Excavation, stockpiling, and removal of unsuitable soils at the new ADA walkways, sidewalk, and utilities and replace with imported suitable backfill materials that is more than or less than 250 cubic yards specified in accordance with requirements of Section 31 20 00 - Earth Moving.
   b. Unit Price No. 2: Excavation, stockpiling, and removal of unsuitable soils at the building, retaining walls at footings and replace with imported structural infill compacted in place that is more than or less than 100 cubic yards specified in accordance with requirements of Section 31 20 00 - Earth Moving.
   c. Unit Price No. 3: Excavation, stockpiling, and removal of ledge and boulders measured at 2 cubic yards and larger at the new elevator pit and replace with imported structural infill compacted in place that is more than or less than 50 cubic yards specified in accordance with requirements of Section 31 20 00 - Earth Moving.
2. Thorndyke Road Elementary School:
   a. Unit Price No. 4: Excavation, stockpiling, and removal of unsuitable soils at the existing sloped walkway and replace with imported suitable backfill materials that is more than or less than 100 cubic yards specified in accordance with requirements of Section 31 20 00 - Earth Moving.
   b. Unit Price No. 5: Excavation, stockpiling, and removal of unsuitable soils at the new elevator pit and replace with imported structural infill compacted in place that is more than or less than 100 cubic yards specified in accordance with requirements of Section 31 20 00 - Earth Moving.

PART 2 – PRODUCTS

2.01 FILL MATERIAL

A. Structural fill for support of Building foundations, floor slabs and base course for concrete sidewalks and pads shall be widely graded sand and gravel, free of clay, organic material, snow, ice, frozen soil or other deleterious materials, and conforming to the following graduation requirements. Soil finer than the No. 200 sieve shall be non-plastic. Structural Fill shall have a plasticity index of less than 6 and shall be compacted in maximum 9-inch loose lifts to at least 95 percent of the Modified Proctor maximum dry density (ASTM D1557), with moisture contents within +- 2 percentage points of the optimum moisture content.

U.S. Bureau of Standards	**Percent Passing**	
Sieve Size and Number	Minimum	Maximum
3- inches	100 percent	
1-1/2 inch	80 percent	100 percent
1/2 inch	50 percent	100 percent
No.4	30 percent	85 percent
No.20	15 percent	60 percent
No.60	5 percent	35 percent
No.200	0 percent	*10 percent

* 0–5 for the top 12 inches under sidewalks, exterior slabs, pads, and walkways

3. Material falling within the above Specifications, encountered during the excavation, shall be stored in segregated stockpiles for reuse as Compacted Structural Fill. All material shall be subject to approval by the Architect.

B. Processed gravel for base course for bituminous concrete pavement shall be a processed material with angular particles meeting the requirements conforming to S.S.H.B. Section M1.03.1.

U.S. Bureau of Standards	**Percent Passing**	
Sieve Size and Number	Minimum	Maximum
3-inches	100 percent	----
1-1/2 inch	70 percent	100 percent
No.3/4	50 percent	85 percent
No.4	30 percent	60 percent
No.200	3 percent	10 percent

C. Ordinary Fill - Well-graded, natural inorganic soil approved by the Architect and meeting the following requirements to be used for general filling to subgrades in lawn areas and to the bottom of the subbase beneath pavements, sidewalks and other than specified above, and conforming to the following graduation requirements. Soil finer than the No. 200 sieve shall be nonplastic. Ordinary Fill shall have a plasticity index of less than 6 and shall be compacted in maximum 9-inch loose lifts to at least 95 percent of the Modified Proctor maximum dry density (ASTM D1557), with moisture contents within +- 2 percentage points of the optimum moisture content.

U.S. Bureau of Standards	**Percent Passing**	
Sieve Size and Number	Minimum	Maximum
6-inches	100 percent	----
1 inch	50 percent	100 percent
No.4	20 percent	100 percent
No. 20	10 percent	70 percent
No.60	5 percent	45 percent
No.200	0 percent	20

4. It shall be free of organic or other weak or compressible materials, of frozen materials, trash or other deleterious materials and of stones larger than six (6) inches maximum dimension.
5. It shall be of such nature and character that it can be compacted to the specified densities in a reasonable length of time.
6. It shall be free of highly plastic clays, of all materials subject to decay, decomposition or dissolution and of cinders or other materials which shall corrode piping or other metal.
7. It shall have a maximum dry density of not less than one hundred (100) pounds per cubic foot.

8. Material from excavation on the site may be used as ordinary fill if it meets the above requirements.
9. Excavated rock and boulders not to exceed two (2) cubic yards may be used only in fill areas under lawns, provided they are at a minimum of twenty-four (24) inches below subgrades, placed and compacted in layers with no voids and all interstices filled.
10. Ordinary Fill and Processed Gravel for base course shall be tested for gradation using wash sieves using the appropriate ASTM Standards.
11. Dense graded crushed stone shall consist of durable crushed rock or durable crushed gravel stone, free from ice and snow, sand, clay, loam, or other deleterious material, conforming to SSHB, Section M2.01.0 through M2.01.6 size as indicated on Drawings. The dense graded crushed stone shall be uniformly blended and conform to the following gradation requirements. Dense graded stone shall be used as base under bituminous pavements and in the student garden under and around the planting beds.

	Percent Passing By Weight		
Sieve Size	1/2-Inch Stone	3/4-Inch Stone	1.5-Inch Stone
2 inches	100	100	100
1 ½ inch	100	100	95-100
1 inch	100	100	35-70
3/4 inch	100	90-100	0-25
5/8 inch	100	---	---
1/2 inch	85-100	10-50	---
3/8 inch	15-45	0-20	---
No. 4	0-15	0-5	---
No. 8	0-5	---	---

D. Sand shall consist of clean inert, hard, durable grains of quartz or other hard durable rock, free from clay, organics, surface coatings or other deleterious material, confirming to SSHB Section M1.04.1. Sand shall conform to the following gradation:

Sieve Size	**Percent Passing by Weight**
1/2-inch	100
3/8-inch	85-100
No. 4	60-100
No. 16	35-80
No. 50	10-55
No. 100	2-10

E. Pea stone for use in the stone drip strip shall consist of durable crushed rock or durable crushed gravel stone free from ice and snow, sand, clay, loam, or other deleterious or organic material. The pea gravel shall be double washed and shall be ¼-inch to 3/8-inch in size or equivalent to #9 double washed crushed stone.

F. Infiltration System and Subsurface Drain Stone - The crushed stone placed below, around, and above the infiltration chambers will be carefully placed and compacted washed and graded crushed stone meeting MassDOT Standard Specifications for material hardness and abrasion resistance. The crushed stone shall be even graded with a actual size of the stone shall be 1- 2 inches only. No smaller or larger grades.

G. Loam Borrow - Loam borrow shall meet the requirements of MassDOT Standard Specifications for M1.05.0. Existing topsoil may also be excavated, stockpiled, screened and reused as loam on the project provided that the resultant material is consistent with the requirements of the MassDOT Standard Specifications. All topsoil shall be screened free of roots, rocks and vegetative matter.

2.02 FILTER FABRIC

A. Conform to MassDOT Standard Specifications for Type III Fabric Embankment or Subgrade Stabilization, Section M9.50.0, Mirafi 140 Filter Fabric, or approved equivalent.

2.03 VAPOR RETARDER:

A. Vapor Retarder must have the following qualities:
   1. WVTR less than or equal to 0.006 gr/ft2/hr as tested by ASTM E 96
   2. ASTM E 1745 Class A (Plastics)

B. Vapor Retarder Products:
   1. Stego Wrap (15-mil) Vapor Barrier by Stego Industries, LLC, San Juan Capistrano, CA (877) 464-7834 www.stegoindustries.com, or approved equivalent.

C. Accessories:
   1. Vapor Retarding Seam Tape must have the following qualities:
      a. Water Vapor Transmission Rate of 0.3 perms or lower by ASTM E 96
   2. Vapor Proofing Mastic have the following qualities:
      a. Water Vapor Transmission Rate of 0.3 perms or lower by ASTM E 96
   3. Pipe Boots:
      a. Construct pipe boots from vapor barrier material, pressure sensitive tape and/or mastic per manufacturer’s instructions.

2.04 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:
   1. Red: Electric
   2. Yellow: Gas
   3. Orange: Telephone and other communications.
   4. Blue: Water System
   5. Green: Sewer

PART 3 - EXECUTION

3.01 EXCAVATION

A. General

1. Excavate all materials to the elevations, dimensions and form as shown on the Drawings and as specified for the construction of the building, site walls, utility structures, utilities, paving, site improvements and other structures necessary for the completion of the building, utilities, and site work. All unsuitable materials within the indicated and specified limits shall be excavated and removed from the site. Unsuitable materials shall include the following:
   a. Pavements, utility structures, building foundations and other man-made structures.
   b. Peat, organic silt ,and other organic materials subject to decomposition, consolidation, or decay.
   c. Miscellaneous fill including sand, gravel, cinders, ash, glass, wood, and metal.
   d. Ledge or boulders except as specified for fills herein.
   e. Material that contains more than 3 percent organic matter by weight.
2. All unsuitable materials within the indicated and specified limits shall be excavated and removed from the site. The removal shall vertically extend to the elevations of the bottom of existing fill and buried organic soil shown in the boring and test pit logs included in the Geotechnical Report or to the limits shown in the drawings, whichever is deeper. Horizontally, the removal shall extend to the limits of ZOI or 5 feet beyond the limits of the building and 2 feet outside the limits of footings of retaining walls, stairs, and ramps. The excavations shall be carried at least 12 inches beneath the bottom of footings and 12 inches beneath the bottom of slabs. The grades within the building and all footings shall be restored to the bottom of footings and slabs using Structural Fill.
3. Employ a Registered Land Surveyor to survey to bottom of the excavation for unsuitable soils. Excavations shall be surveyed at the corners, high and low points, and a maximum spacing for survey points of 20 feet in each direction on a grid.
4. The topsoil/subsoil layer, root balls, where encountered, organic soil, the existing fill, and other deleterious matter shall be entirely removed from within the proposed building footprint.
5. Topsoil/subsoil, organic material, root balls, where encountered, and other deleterious material shall be entirely removed from within the paved areas.
6. Cobbles and boulders shall be removed at least 6 inches from beneath footings and 18 inches from beneath the bottom of slabs within the entire building footprint, and 2 feet beneath the bottom of paved areas. The resulting excavations should be backfilled with compacted Structural Fill under the building and with Ordinary Fill under the subbase of paved areas.
7. Minimum depth of excavation in rock shall be performed in accordance with the requirements in Section 3.04 E.
8. The base of the footing excavations in the natural soil shall be compacted with a dynamic vibratory compactor weighing at least 200 pounds and imparting a minimum of 4 kips of force to the subgrade before placing concrete.
9. The subgrades of slabs and paved areas in the natural soil shall be compacted with a vibratory roller compactor imparting a dynamic effort of at least 40 kips. Where soft materials are encountered, they shall be removed and replaced with Structural Fill within the footprint of the proposed building and with Ordinary Fill within the proposed paved areas.

10. Where paved areas are located in existing fill areas, the existing fill shall be improved after the surficial topsoil and subsoil are removed by compacting the exposed subgrade in the fill using at least six (6) passes of a vibratory roller compactor imparting a dynamic effort of at least 40 kips. Where soft zones are revealed by the compaction effort and where organic soil is exposed, the soft materials or organic oil shall be removed and replaced with Ordinary Fill to the bottom of the subbase layer.
11. The Contractor shall obtain from the proper authority locations of all utilities within the scope of this work so that there will be no damage done to such utilities. Neither the Owner nor the Architect will be responsible for any such damage, and the Contractor shall restore any structure or utility so damaged without additional compensation. Written notifications to the appropriate utility agencies shall be made at least ten (10) days prior to the commencement of any work.
12. Excess Material - Suitable excavated material which is required for fill and backfill shall be separately stockpiled as directed by the Architect. All surplus fill other than that required to complete the intent of the Contract shall become the property of the Contractor and shall be disposed of off the property by the Contractor. All excavated materials which, in the opinion of the Architect, are not suitable for fill or backfill shall be removed and disposed of off the property.
13. Any unsanitary conditions encountered, such as broken sewer mains or uncovered garbage shall be corrected or removed entirely as directed by the Architect.

B. Should quantities of certain materials or classes of work be increased or decreased from what is shown in the drawings and specified herein, the Contract Unit Rates listed below shall be the basis of payment to the Contractor, or credit to the Owner, for such increase or decrease in the work. The Contract Unit Rates shall represent the exact net amount, per unit, to be paid to the Contractor in the case of increase in the quantities, and the exact amount to be refunded to the Owner in the case of decreases in the quantities. No additional adjustment shall be allowed for overhead, profit, insurance, or other direct or indirect expenses by the Contractor. Contract Unit Rates of materials shall include hauling, storing, stockpiling, moving, importing, spreading, and compacting. Increases or decrease in the quantities shall be approved by the Owner.

C. Provide unit-process as follows:
1. For each type of material listed in PART 2 – PRODUCTS, separate unit rates shall be provided for imported material and material processed onsite. The unit rates shall include furnishing/processing, stockpiling, placing, and compacting the material.
2. Provide unit rate for rock excavation in trenches and pits, removed from the site, and any placement of fill required to bring excavated surface to specified subgrade.
3. Provide unit rate for rock excavation as open excavation, removed from the site, and any placement of fill required to bring excavated surface to specified subgrade.

D. Excavation for Site Improvements
1. Excavate to the lines and grades shown on the Drawings and as specified to obtain the subgrades for the following items of work:
   a. Concrete slabs on grade
   b. Bituminous concrete road and parking pavement Concrete paving
   c. Curbing Seeded areas
   d. Shrub beds and trees

e. Unspecified improvements – to bottom elevation of item plus ample working space on all sides.

E. Utilities and Utility Structures

1. Construct surface subgrades including filling prior to excavation for utilities and utility structures. Excavate to the lines and grades shown on the Drawings and as specified herein to obtain the subgrade for the following items of work:
   a. Utility structures - to grades shown on the Drawings in the building and outside the building. Remove by excavating all unsuitable materials; including buried organics, from under drainage structures and backfill with specified fills compacted in place to subgrades.
   b. Excavation for structures and other accessories shall have twelve (12) inch minimum and twenty-four (24)
   c. inch maximum clearance on all sides.
   d. All utility lines - to 12 inches below bottom of utility lines or structures.
   e. Trench for water pipe to provide a minimum of five feet of cover above top of pipe.
   f. Unless otherwise shown, provide separate trenches for each utility. Lay all piping in open trenches except where tunneling is required. Excavation for structures and other accessories shall have 12 in. minimum and 24 in. maximum clearance on all sides.
   g. Grade the bottom of trenches evenly to have a constant pitch in the direction of flow and to insure a uniform compacted thickness of selected material as called for.
2. Existing services and utilities encountered shall be immediately repaired, protected, and maintained in use until relocation of same has been completed or be cut and capped where directed or be prepared for connections when so required.

3.02 FROST PROTECTION

A. Protect excavation bottoms and sides against freezing. Provide protective insulating materials as necessary, including by means of heat blankets, and heating plant.

B. A layer of fill shall not be left in an uncompacted state at the close of a day’s operation when there is the potential for

C. that layer to freeze.

D. The Contractor shall not place any material on snow, ice, frozen soil, or soil that was permitted to freeze prior to

E. compaction. Removal of these unsatisfactory materials will be at the Contractor’s expense.

F. Do not excavate to full indicated depth when freezing temperatures may be expected, unless work can be completed to subgrade, the materials installed, and the excavation backfilled the same day. Protect the excavation from frost if placing of materials or backfilling is delayed.

G. The Contractor shall keep the operations under this Contract clear and free of accumulation of snow within the limits of Contract Lines as necessary to carry out the work.

H. Fanon materials shall be installed on frozen ground. Fill materials shall be free of frost.

I. The subgrade of footings and slabs shall be protected from frost before placing concrete. The subgrade on the sides of the footings shall be protected from frost after the footings are constructed until sufficient fill is placed to protect the bottom of footings from frost induced heave. Uninsulated slabs shall be covered with heat blankets until the slab areas are heated. The cover shall extend at least 4 feet beyond the limits of the slabs.

3.03 DISTURBANCE OF EXCAVATED AND FILLED AREAS DURING CONSTRUCTION

J. The Contractor shall take the necessary steps to avoid disturbance of subgrade and underlying natural soils/compacted fill during excavation and filling operations. Methods of excavation and filling operations shall be revised as necessary to avoid disturbance of the subgrade and underlying natural soils/compacted fill, including restricting the use of certain types of construction equipment and their movement over sensitive or unstable materials. The Contractor shall coordinate with the Architect or Soils Representative to modify his operations as necessary to minimize disturbance and protect bearing soils, based on the Architect's or Soils Representative's observations.

K. All excavated or filled areas disturbed during construction, all loose or saturated soil, and other areas that will not meet compaction requirements as specified herein shall be removed and replaced with compacted approved material in accordance with these Specifications. Fill that cannot be compacted within 48 hours because of its saturated condition shall be removed and replaced with compacted approved material in accordance with these Specifications. Costs of removal of disturbed material and replacement with approved material shall be borne by the Contractor.

L. If requested by the Architect or Geotechnical Engineer, the Contractor shall place a six-inch layer of Crushed Stone or 12-inch layer of Granular Fill/Structural Fill over natural underlying soil to stabilize areas disturbed during construction.

M. The placement of the Crushed Stone layer or Granular Fill/Structural Fill as well as material costs shall be borne by the Contractor. A geotextile fabric shall be used to separate the crushed stone from the natural soil and from the overlying fill when directed by the Geotechnical Engineer at no additional cost to the owner at no extra cost to the owner.

N. Material that is above or below optimum moisture for compaction of the particular material in place as determined by the Architect or the Soils Representative and is disturbed by the Contractor during construction operations so that proper compaction cannot be reached shall be classified as unsuitable bearing materials. This material shall be removed and replaced with lean concrete, suitable/approved backfill material, or crushed stone as directed by the Geotechnical Engineer or Soils Representative at no additional cost to the Owner.

3.04 FILLS, BACKFILLS AND COMPACTION

A. Samples and Testing

1. All fill material and its placement shall be subject to quality control testing. A qualified laboratory will be selected by the Owner to perform tests on materials. All costs of testing will be paid for by the Owner. Test results and laboratory recommendations shall be available to the Architect.
2. Provide samples of each fill material from the proposed source of supply including on-site sources. Allow sufficient time for testing and evaluation of results before material is needed. Submit samples from alternate source if required.

3. Architect will be sole and final judge of suitability of all material.
4. The laboratory will determine maximum dry density and optimum water content in accordance with A.S.T.M.
5. D-1557, Method D and the in-place density in accordance with A.S.T.M. D-1556.
6. Tests of material as delivered shall be made from time to time. Materials in question shall not be used, pending test results. Tests of compacted materials will be made regularly. Remove rejected materials and replace with approved material.
7. Cooperate with laboratory in obtaining field samples of in-place materials after compaction. Furnish incidental field labor in connection with these tests.

B. Placing Fills and Compacting

1. Fill material shall be placed in horizontal layers not exceeding the maximum loose lift thickness with the minimum number of passes of compaction equipment as summarized on the table below. Each layer shall be compacted to the percentage of maximum dry density specified for the particular type of fill and at a water content equal to optimum water content plus or minus two (2) percent. The maximum dry density and optimum water content shall be as specified herein:

	Max Stone Size	**Max. Loose Lift Thickness** Below Structures & Pavements	Less Critical Areas	**Min, Number of Passes** Below Structures & Pavements	Less Critical Areas
Hand-operated vibratory plate or light roller in confined areas	4 in.	8 in.	8 in.	6	4
Hand-operated Vibratory drum rollers weighing at least 1,000# in confined areas	6 in.	8 in.	10 in.	6	4
Light vibratory drum Roller, minimum weight at drum 5,000#, minimum Dynamic force 10,000#	6 in.	10 in.	12 in.	6	4
Medium to heavy Vibratory drum roller, Minimum weight at Drum 10,000#, minimum Dynamic Force 20,000#	8 in.	12 in.	12 in.	6	4

2. Areas to be filled or backfilled shall be free of construction debris, refuse, compressible or decayable materials and standing water. Do not place fill when fill materials or layers below it are frozen.

3. Notify the Architect when excavation is ready for inspection. Filling and backfilling shall not be started until conditions have been approved by the Architect.
4. Before backfilling against walls, the permanent structures must be completed and sufficiently aged to attain strength required to resist backfill pressures without damage. Temporary bracing will not be permitted except by written permission from the Architect. When filling on both sides of a wall or pier, place fill simultaneously on each side. Correct any damage to the structure caused by backfilling operations at no cost to the Owner. Place no stones closer than 18 inches to wall surfaces.
5. In confined areas adjacent to footings and foundation walls and in utility trenches beneath floor slab, the fill shall be compacted with hand operated vibration tampers. The maximum lift thickness shall be four inches. The degree of compaction attained shall be equivalent to that attained in the adjacent open areas where heavy rolling equipment is used.
6. After the subgrade under concrete slabs and paved areas has been shaped to line, grade and cross-sections, it shall be rolled with an approved power roller weighing not less than six tons until thoroughly compacted. This operation shall include any reshaping, refilling or wetting required to obtain proper compaction. Any areas that subsequently settle shall be refilled to true subgrade and properly compacted.
7. In freezing weather, a layer of fill shall not be left in an un-compacted state at the close of a day's operations. Prior to terminating operations for the day, the final layer of fill, after compaction, shall be rolled with a smooth-wheeled roller to eliminate ridges of soil left by tractors, trucks and compaction equipment.

C. Placing Fills
1. In the building footprint Structural Fill shall be placed under the concrete footings and slabs. Ordinary Fill shall be placed under Processed Gravel for Subbase in paved areas. The material shall be placed and compacted in layers as described in the above table and compacted to at least 95 percent of maximum dry density as determined by A.S.T.M. Test D1557.with moisture contents within +- 2 percentage points of optimal moisture content. Incidental compaction due to traffic by construction equipment will not be credited toward the required minimum coverages.
2. Placement of structural fill should not be conducted when air temperatures are low enough to cause freezing of the moisture in the fill during or before placement, approximately 32 degrees F., or below. Fill materials should not be placed on snow, ice or un-compacted frozen soil. Structural fill should not be placed on frozen soil. No fill should be allowed to freeze prior to compaction. At the end of each day's operations, the last lift of fill, after compaction, should be rolled by a smooth-wheeled roller to eliminate ridges of un-compacted soil and protected from freezing.

D. Deficiency of Fill Materials
1. Provide required additional fill materials as specified if a sufficient quantity of suitable materials is not available from the required excavation on the project site at no additional cost to the Owner.
2. Where water content of the fill must be adjusted to meet this Specification, the fill shall be thoroughly disked to ensure uniform distribution of any water added.

E. Fill and Backfill for Utilities

1. Backfill trenches only after pipe and leaching chambers have been inspected, tested and locations of pipes and appurtenances have been recorded.
2. Each pipe section shall be laid on a 12 inches minimum bed of crushed stone as specified herein above. In addition, all underground utilities in the building and on the site including water lines, sanitary waste, vent piping, electrical conduit, mechanical piping, gas piping and storm drainage piping serving the roof drains and =downspouts shall be set in a six inches bed of sand. Bed shall be shaped by means of hand shovels to give full and continuous support to the lower 1/3 of each pipe. Backfill by hand around pipe, until the crown of the pipe if covered by at least two (2) feet of sand for which there is a sieve analysis chart on page 8, paragraph 2.01D. Use sand or crushed stone and tamp firmly in layers not exceeding six inches in thickness. Take care not to disturb the pipe. Compact the remainder of the backfill thoroughly with a rammer of suitable weight or with an approved mechanical tamper to achieve compaction of 95 percent as specified.
3. Trenches and utility structures shall be backfilled with greatest care; fill materials required for backfilling to subgrades shall be Structural Fill or Ordinary Fill as specified. Backfill shall be compacted to 95 percent as specified. No mud, frozen earth or stone more than six inches in greatest diameter or other objectionable material shall be used for refilling. Any selected material required for filling shall be furnished and placed by the Contractor

3.05 ROCK EXCAVATION

A. Should highly fractured or weathered bedrock and boulders be encountered during excavation, the following shall apply:

1. When rock is encountered within the building footprint and its zone of influence and site improvements it shall be excavated or ripped with a hydraulic excavator. When it is demonstrated to the satisfaction of the Architect and the Geotechnical Engineer that this material can no longer be removed with a hydraulic excavator and requires drilling and blasting, this material shall be classified as Rock Excavation.

B. Intermittent drilling and ripping performed to increase production and not necessary to permit excavation of material.

C. Measurements:

1. When, during the process of excavation, rock is encountered, it shall be uncovered and exposed in such a manner that the unbroken ledge surface is clearly visible, and the Architect shall be notified by the General Contractor, before proceeding further. The areas in question shall then be cross-sectioned as hereinafter specified.
2. The General Contractor shall perform rock probes at the site in a grid pattern before the start of excavations. At a minimum, the results of the probes should include the ground surface elevation and the elevation of the top of the rock. The probes should extend at least 10 feet beyond the perceived top of rock to make sure that the perceived top of rock is not a boulder.
3. Failure on the part of the General Contractor to perform the probes and identify the depth to top of the rock surface and to notify the Architect and proceeding by the General Contractor with the rock excavation before cross- sections are taken, shall forfeit the General Contractor right of claim towards the stated allowance or additional payment over and above the stated allowance at the quoted unit price.

4. The General Contractor shall employ and pay for a licensed Registered Civil Engineer or Land Surveyor to take cross- sections of rock before removal and to make computations of volume of rock encountered within the Payment Lines. Cross-sections shall be taken in the presence of the Geotechnical Engineer and the computations approved by the Architect. The Owner has the option to perform independent cross-sections and computations of rock quantities.
5. Where removal of boulder or ledge is required the extent of this removal and basis of payment shall be determined by the Architect with payment made as stated in Unit Prices.

D. Blasting

1. Blasting: Obtain written permission and approval of method from local authorities before proceeding with rock excavation. Explosives shall be stored, handled, and employed in accordance with state and local regulations or, in the absence of such, in accordance with the provisions of the "Manual of Accident Prevention of Construction" of the Associated General Contractors of America, Inc.
2. Notify the Architect at least 48 hours before any intended blasting and do no blasting without his specific approval of each blasting operation.
3. General Contractor shall present evidence that his insurance includes coverage for blasting operations before doing any blasting work. A pre and post survey shall be performed for all buildings and utilities within 250 feet of the nearest blasting operations, conforming to the Municipal ordinance governing blasting and the Municipal Fire Department regulations.
4. All rock blasting shall be well covered with heavy mats or timbers chained together and the General Contractor shall take great care to do no damage to existing structures, utility lines and trees to remain.
5. Any damage caused by the work of this General Contractor shall be repaired to the full satisfaction of the Architect at no additional cost to the Owner.
6. Any rock fragments or loose material from blasting operations shall be removed. All voids shall be filled with a leveling layer of Structural Fill
7. Additional blasting requirements:
   a. Comply fully with National Regulations.
   b. All documentation submitted with application for “Use and Handling’ PERMIT. 527 CMR 13:04 (11) E-1 states “A Use and Handling” Permit may be suspended or revoked by the head of the Fire Department or the Marshal or their designees for any violation of 527 CMR 13:00, or MGL c. 148”
   c. Meet all requirements of 527 CMR 13;00
   d. All Pre-Blast Surveys completed per 527 CMR 13:00
   e. Hours of Blasting 09:00 hrs. through 16:00 hrs. Mon.through Fri.
   f. No Blasting Saturdays, Sundays or Holidays.
   g. All shots to be double matted unless approved in advance by the Fire Chief.
   h. Shot size limited to 500 lbs. unless approved in advance by the Fire Chief.
   i. Blast warning signals to be sounded in accordance with 527 CMR 13:00
   j. 24 hours notification to the fire department of intent to blast.

k. In or near residential areas, written notification must be distributed to homes advising of intent to blast at least three (3) days prior to blasting operations. Such written notification to include time frame of blasting operations and description of warning signals. The area of distribution shall be determined by the Fire Chief during pre-blast conference. A Fire Department detail shall be required unless waived by the Fire Chief.

l. Two or more seismographs required on allshots.

m. All seismographs to be calibrated and certified according to manufactures specifications and 527 CMR 13:00

E. Rock should be cut at least 12 inches beneath the bottom of footings, 2 feet beneath the bottom of slabs, 18 inches beneath the bottom of paved areas, and 12 inches below the bottom of utilities. Laterally, the rock should be removed at least 1 foot beyond the limits of footings and 2 feet beyond the limits of walls. Rock should be cut a minimum of 12 inches outside utility structures and a minimum of 18 inches on each side of utility pipes

F. Rock surfaces that heave due to blasting should be compacted with a vibratory roller that imparts a minimum of 40 kips to the rock surface. To reduce the magnitude of rock heave, drilling for blast holes should extend no more than 2 feet beneath proposed subgrades.

G. Complaints:

1. Report all blasting complaints to the Architect within 24 hours of receipt thereof. Include the name, address, date, time received, date and time of blast complained about, and a brief description of the alleged damages or other circumstances upon which the complaint is predicated. Assign each complaint a number, and number all complaints consecutively in order of receipt.
2. Submit a summary report to the Architect each week which indicates the date, time and name of person investigating the complaint, and the amount of damage, if any.
3. When settlement of a claim is made, furnish the Architect with a copy of the release of claim by the claimant.
4. Immediately notify the Architect, throughout the statutory period of liability, of any formal claim or demands made by attorneys on behalf of claimants, or of serving of any notice, summons, subpoena, or other legal documents incidental to litigation, and of any out-of-court settlement or court verdict resulting from litigation.
5. Immediately notify the Architect of any investigations, hearings, or orders received from any governmental agency, board or body claiming to have authority to regulate blasting operations.

H. Basis of Payment: The total amount of rock excavation shall be based upon the volume of rock excavated within and/or above the lines referred to in the next paragraph as "Payment Lines". The payment lines are only to be used as a basis of payment and are not to be used as limits of excavation. Limits of excavation area as shown on the Drawings and as specified herein.

1. Payment Lines for Rock Excavation:
   a. Payment lines for rock excavation shall be at the specified subgrades.

3.06 OFF-SITE DISPOSAL OF SOILS

A. All off-site disposal of soils shall meet the minimum requirements of the following as applicable:

1. DEP Policy #Comm-97-001: Reuse and Disposal of Contaminated Soil at Massachusetts Landfills.

2. DEP Policy #WSC-13-500: Similar Soils Provision Guidance

B. The Contractor is responsible for any and all disposal characterization sampling and analysis and preparation of disposal applications as required by the facility to be used. Copies of all applications and approvals.

3.07 TEMPORARY STEEL SHEETING

A. An excavation support system will be required to construct the proposed foundations near roadways and sidewalks as referenced in the Drawings. The contractor is responsible for the adequacy of the excavation support system and shall retain the services of a Professional Engineer registered in the Commonwealth of Massachusetts to design the required excavation support systems. The contractor's Professional Engineer shall practice in a discipline applicable to excavation work, shall have experience in the design of excavation support system and shall design in conformance with OSHA requirements. The contractor's Professional Engineer shall provide sufficient on-site inspection and supervision to assure that the excavation support system is installed and functions in accordance with his design. Criteria listed here in defining the responsibilities of the construction manager's Professional Engineer are minimum requirements.

B. The contractor shall submit the attached Certificate of Design completed and signed by the contractor and the Professional Engineer, identifying the Contractor's Professional Engineer who will be responsible for design of the excavation support system, and including, for record purposes only:

1. An overall time schedule for construction of the braced excavation system.
2. A description of the anticipated sequence of construction.
3. Submit three (3) copies to the Architect of:
    a. Complete details of braced excavation methods, equipment and sizes and lengths of materials proposed to be used.
    b. Details of vibration monitoring devices and reports.
    c. Details of the means and methods that will be used in monitoring the integrity of the support system during its entire period of use to ensure the safety of the excavation.
    d. Complete computations of the design of the braced excavation system bearing the seal of the responsible Registered Professional Engineer duly registered licensed to practice within a discipline applicable to excavation work, in the state where the project is located.
    e. Any other pertinent data required for record purposes by the Engineer.
4. Receipt of the information by the Architect will not relieve the contractor of the sole responsibility for the adequacy of the braces excavation system, and for assuring that there will be no resulting damage to adjacent existing pavement, utilities, or structures, and for providing safe conditions within the sheeted areas.
5. Further for the record, upon completion of the work of this section, the contractor shall submit three copies of all records of survey, vibration monitoring and inspection of existing structures to the Architect.
6. Work shall not be started until all materials and equipment necessary for construction are either on the site of the work or satisfactorily available for immediate use as required.
7. The sheeting shall be sufficiently tight to minimize any resulting lowering of the groundwater level outside the excavation.

8. The sheeting shall be driven by approved means to the design elevation. No ends or edges of sheeting shall be left exposed in a manner, which could create a possible had to safety of the public or a hindrance to traffic of any kind.
9. The satisfactory construction and maintenance of the excavation support system, complete in place, shall be the responsibility of the contractor.

3.08 SUBGRADE PREPARATION

A. Bring all areas to required subgrade levels as specified and as determined from the Drawings.

B. Maintain all subgrades for site improvements in satisfactory condition, protected against traffic and properly drained, until the surface improvement is placed. In areas to receive pavement or other surface materials, at top and bottom of embankments, along swales and elsewhere, place sufficient grade stakes to facilitate checking the subgrade levels. Correct all irregularities, compacting thoroughly any fill materials.

C. Check all manhole covers, grates, valve boxes and similar structures for correct elevation and position and make, or have made any necessary adjustments in such structures.

D. All subgrades must be inspected and approved by the Architect before site improvements are made.

E. The asphalt, topsoil/subsoil, root balls, organic soil, existing fill, and other deleterious matter shall be entirely removed from within the proposed building footprint.

F. Topsoil/subsoil, asphalt, organic material, root balls, and other deleterious material shall be entirely removed from within the paved areas.

G. Tree stumps, root balls, and roots larger than ½ inch in diameter shall be removed and the cavities shall be filled with Structural Fill within the building footprint and Ordinary Fill beneath the subbase layer within paved areas.

H. The base of the footing excavations in the natural soil shall be compacted with a dynamic vibratory compactor weighing at least 200 pounds and imparting a minimum of 4 kips of force to the subgrade, before placing concrete.

I. The subgrades of slabs and paved areas in the natural soil shall be compacted with a heavy vibratory roller compactor imparting a dynamic effort of at least 40 kips.

J. Where soft zones are revealed by the compaction effort and where organic soil is exposed, the soft materials or organic soil should be removed and replaced with Structural Fill within the building and with Ordinary Fill beneath the subbase of paved areas

K. Due to the high susceptibility of the natural soil for disturbance under foot and vehicular traffic, a minimum of 12 inches of Structural Fill shall be placed under footings on top of the natural soil to provide a firm working surface during placement of formwork and rebar.

L. Fill placed within the footprint of the proposed building shall meet the gradation and compaction requirements of Structural Fill.

M. Fill placed under the subbase of paved areas, shall meet the gradation and compaction requirements of Ordinary Fill.

N. Fill placed in the top 12 inches beneath sidewalks shall consist of Structural Fill with less than 5 percent fines.

O. When crushed stone is required in the drawings or it is used for the convenience of the contractor, it shall be wrapped in a geotextile fabric for separation.

3.09 PROTECTION, SHORING AND DEWATERING

A. Protect open excavations with steel plates, fencing, warning lights and other suitable safeguards.

B. Provide all pumps and pumping facilities to keep all excavations free from water from whatever source at all times, when work is in progress.

C. The Contractor shall control the grading in areas under construction on the site so that the surface of the ground will properly slope to prevent accumulation of groundwater and surface water in excavated areas and adjacent properties.

D. The Contractor shall provide, at his own expense, adequate pumping and drainage facilities to maintain the excavated area sufficiently dry from groundwater and/or surface runoff so as not to adversely affect construction procedures nor cause excessive disturbance of underlying natural ground. The flows of all water resulting from pumping shall be managed so as not to cause erosion, siltation of drainage systems, or damage to adjacent property.

E. The groundwater level shall me maintained at 12 inches beneath the bottom of excavation or deeper until the excavation is backfilled to at least 2 feet above the groundwater level.

F. Damage resulting from the failure of the dewatering operations of the Contractor, and damage resulting from the failure of the Contractor to maintain all the areas of work in a suitable dry condition, shall be repaired by the Contractor, as directed by the Engineer, at no additional expense to the Owner. The Contractor's pumping and dewatering operations shall be carried out in such a manner as to prevent damage to the Contract work and so that no loss of ground will result from these operations. Precautions shall be taken to protect new work from flooding during storms or from other causes. Pumping shall be continuous to protect the work and/or to maintain satisfactory progress.

G. All pipelines or structures not stable against uplift during construction or prior to completion shall be thoroughly braced or otherwise protected. Water from the trenches, excavations, and stormwater management operations shall be disposed of in such a manner as to avoid public nuisance, injury to public health or the environment, damage to public or private property, or damage to the work completed or in progress.

H. The Contractor shall excavate interceptor swales and ditches, as necessary, prior to the start of major earthmoving operations to reduce the potential for erosion and to keep areas as free from surface and ponded water as possible.

I. All piping exposed above ground surface for this use, shall be properly covered to allow foot traffic and vehicles to pass without obstruction.

J. Should surface, rain or groundwater be encountered during the operations, the Contractor shall furnish and operate pumps or other equipment and provide all necessary piping to keep all excavations clear of water at all times and shall be responsible for any damage to work or adjacent properties for such water. All piping exposed above ground surface for this use, shall be properly covered to allow foot traffic and vehicles to pass without obstruction.

K. The presence of groundwater or stormwater in soil will not constitute a condition for which an increase in the contract price may be made. Under no circumstances place concrete fill, lay piping or install appurtenances in excavation containing free water. Keep utility trenches free of water until pipe joint material has hardened and backfilled to prevent flotation

3.10 DUST CONTROL

A. Comply with 310 CMR 7.09 “Dust, Odor, Construction and Demolition” of the Commonwealth of Massachusetts.

B. Maintain all excavations, embankments, stockpiles, haul roads, permanent access roads, plant sites, waste areas, borrow areas, and all other work areas free from dust which would cause the standards of air pollution to be exceed or case a hazard or nuisance to others.

C. Take necessary measures to control dust resulting from construction operations and do prevent spillage of material on public roads and streets.

D. Provide wet machine sweeping of street surfaces after each work day or as needed to minimize dust and sediment.

3.11 MAINTENANCE

A. Protection of graded areas: protect newly graded areas from traffic and erosion. Keep free of trash and debris.

B. Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances.

C. Reconditioning compacted areas: where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

D. Settling: where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add fill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work and eliminate evidence of restoration to greatest extent possible.

E. Unless directed otherwise by the City of Worcester Engineering Department, erosion control measures shall be removed within six (6) months after issuance of the Certificate of Occupancy.

3.12 RUBBISH REMOVAL

A. The General Contractor shall remove all waste and debris and dispose of daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION

LGCI
Lahlaf Geotechnical Consulting, Inc.

September 6, 2024

Mr. Bill Peters
Mount Vernon Group Architects, Inc.
178 Albion St., Suite 240
Wakefield, MA 01880
Phone: (781) 213-5030
Direct: (781) 213-5040
E-mail: bpeters@mvgarchitects.com

Re: **Geotechnical Report**
Proposed Improvements –
Lincoln Street Elementary School
Worcester, Massachusetts
LGCI Project No. 2423

Dear Mr. Peters:

Lahlaf Geotechnical Consulting, Inc. (LGCI) has completed a geotechnical study for the proposed improvements at the Lincoln Street Elementary School in Worcester, Massachusetts. We are submitting our geotechnical report electronically.

The soil samples from our explorations are currently stored at LGCI for further analysis, if requested. Unless notified otherwise, we will dispose of the soil samples after three (3) months.

Thank you for choosing LGCI as your geotechnical engineer.

Very truly yours,

Lahlaf Geotechnical Consulting, Inc.



Abdelmadjid M. Lahlaf, Ph.D., P.E.
Principal Engineer

LGCI
Lahlaf Geotechnical Consulting, Inc.

GEOTECHNICAL REPORT
PROPOSED IMPORVEMENTS –
LINCOLN STREET ELEMENTARY SCHOOL
WORCESTER, MASSACHUSETTS

LGCI Project No. 2423
September 6, 2024

Prepared for:

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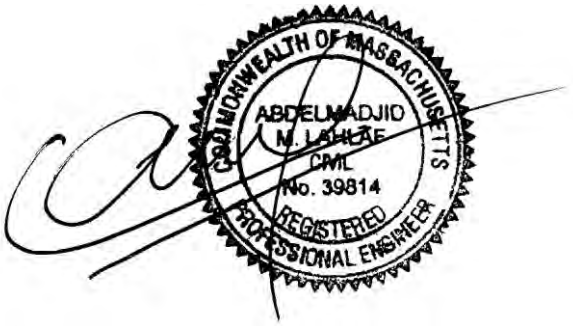
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1. PROJECT INFORMATION

1.1 Project Authorization

This geotechnical report presents the results of the subsurface explorations, and a geotechnical evaluation performed by Lahlaf Geotechnical Consulting, Inc. (LGCI) for the proposed improvements at the Lincoln Street Elementary School in Worcester, Massachusetts. We performed our services in general accordance with our proposal No. 24064 dated June 28, 2024. Mr. William Peters of Mount Vernon Group Architects, Inc. (MVG) authorized our services by signing our proposal on July 11, 2024.

1.2 Purpose and Scope of Services

The purpose of our geotechnical services was to perform subsurface explorations at the site for the proposed improvements at the Lincoln Street Elementary School, and to provide foundation design and construction recommendations. LGCI performed the following services:

- Coordinated our exploration locations with MVG.
- Marked the exploration locations at the site and notified Dig Safe Systems Inc. (Dig Safe) and the City of Worcester for utility clearance.
- Engaged a drilling subcontractor for one (1) day to advance three (3) soil borings at the site.
- Provided an LGCI geotechnical field representative at the site to coordinate and observe the borings, describe the soil samples, and prepare field logs.
- Submitted two (2) soil samples collected from the borings for laboratory testing.
- Prepared this geotechnical report containing the results of our subsurface explorations and our recommendations for foundation design and construction.

Our scope includes preparing specifications, reviewing contract documents, attending meetings, and providing construction services. These services will be performed separately and are not included in this geotechnical report. Recommendations for stormwater management, erosion control, pavement design, site specific seismic and liquefaction analyses, pile analysis and design, FEMA 100-year flood elevation, historic uses of site, contaminated soil and groundwater treatment and disposal requirements and techniques, and cost or quantity estimates are not included in our scope of work.

LGCI's scope of services does not include an environmental assessment for the presence or absence of wetlands or analytical testing for hazardous or toxic materials in the soil, surface water, groundwater, or air, on or below or around this site, or mold in the soil or in any structure



at the site. Any statements regarding odors, colors, or unusual or suspicious items or conditions are strictly for the information of the client.

1.3 Site Description

Our understanding of the site is based on our field observations, our discussions with MVG, and the following drawings:

- Drawing titled: "Plot Plan, Lincoln St. School, Worcester Public Schools," (Plot Plan) provided to LGCI by MVG via email on June 17, 2024.

- Drawing titled: "Existing Conditions Plan, 549 Lincoln Street, Worcester, Massachusetts (Worcester County)," (Existing Conditions Plan) prepared by Brennan Consulting, dated August 14, 2024, and provided to LGCI via e-mail on August 20, 2024.

The site is located at 549 Lincoln Street in Worcester, MA as shown in Figure 1. The site is bordered by Lincoln Street on the northern side, by woods and private properties on the southern and eastern side, and by Tyler Prentice Road on the western side. The site is currently occupied by the existing main school building, a modular building, paved parking lots and driveways, playgrounds, and athletic fields.

Based on the Existing Conditions Plan, the grades at the site generally slope from El. 532 feet near the eastern side of the site to El. 542 feet near the center of the site before sloping back down to El. 532 feet near the southeastern corner of the site. The Existing Conditions Plan indicates the existing school building is a one-story brick building with a basement floor elevation of El. 527.11 feet and a first-floor elevation (FFE) of 546.41 feet.

1.4 Project Description

Our understanding of the proposed construction is based on our discussions with MVG, and the drawings listed in Section 1.3.

We understand that the City of Worcester has engaged MVG to design improvements at the site, including a handicap ramp near Lincoln Street and an interior elevator near the southwestern corner of the modular building just north of the modular building. Information about the layout, the size, and location of the improvements was not available to LGCI.

1.5 Elevation Datum

We understand that the elevations provided in the Existing Conditions Plan are in reference to the North American Vertical Datum of 1988 (NAVD88).



2. SITE AND SUBSURFACE CONDITIONS

2.1 Surficial Geology

LGCI reviewed a surficial geologic map titled: "Surficial Materials Map of the Worcester North Quadrangle, Massachusetts," prepared by Stone, B.D., and Stone, J.R., and DiGiacomo M.L. Scientific Investigation Map 3402, Quadrangle 80 – Worcester North, 2018.

The surficial geologic map of the site indicates that the natural soils in the general vicinity of the site consist of thin till and bedrock outcrops or shallow bedrock.

The thin till consists of nonsorted, nonstratified matrix of sand, some silt, little clay containing scattered pebble, cobble, and boulder clasts. The thin till is generally less than 10 to 15 feet thick.

Bedrock outcrops or shallow bedrock consists of areas where surficial materials are less than 5 to 10 feet thick.

The Surficial Geologic Map is shown in Figure 2.

2.2 LGCI's Explorations

2.2.1 General

LGCI coordinated our exploration locations with MVG and notified Dig Safe and the City of Worcester for utility clearance prior to starting our explorations at the site.

Unless notified otherwise, we will dispose of the soil samples obtained during our explorations after three (3) months.

2.2.2 LGCI's Soil Borings

LGCI engaged Soil Exploration, Corp. (Soil X) of Leominster, Massachusetts to advance three (3) soil borings (B-1 to B-3-OW) at the site on July 23, 2024. The borings were advanced with a B-57 ATV drill rig using 4-¼-inch inner-diameter hollow stem augers. The borings extended to depths ranging between 14.0 and 17.0 feet beneath the ground surface. Upon completion, the boreholes were backfilled with the drill cuttings. The ground surface was restored with cold patch asphalt in paved areas.

Soil X performed Standard Penetration Tests (SPT) and obtained split spoon samples with an automatic hammer at typical depth intervals of 2 feet or 5 feet as noted on the boring logs in general accordance with ASTM D-1586.

An LGCI geotechnical field representative observed and logged the borings in the field.



2.2.3 Exploration Logs and Locations

The boring locations are shown in Figure 3. Appendix A contains LGCI's boring logs and Table 1 includes a summary of LGCI's borings.

2.3 Subsurface Conditions

The subsurface description in this report is based on a limited number of borings and is intended to highlight the major soil strata encountered during our explorations. The subsurface conditions are known only at the actual boring locations. Variations may occur and should be expected between boring locations. The boring logs represent conditions that we observed at the time of our explorations and were edited, as appropriate, based on the results of the laboratory test data and inspection of the soil samples in the laboratory. The strata boundaries shown in our boring logs are based on our interpretations and the actual transitions may be gradual. Graphic soil symbols are for illustration only.

The soil strata encountered in LGCI's borings were as follows, starting at the ground surface.

Topsoil – A layer of surficial organic topsoil was encountered at the ground surface in borings B-1 and B-2. The thickness of the topsoil ranged between 0.9 and 2.0 feet.

Asphalt – A layer of asphalt was encountered at the ground surface in boring B-3-OW. The thickness of the asphalt was 0.5 feet.

Fill – A layer of fill was encountered beneath the topsoil or asphalt in all borings. The fill extended to depths ranging between 4.3 to 7.0 feet beneath the ground surface. The samples in this layer were mostly described as silty sand. One (1) sample was described as poorly graded sand, and two (2) samples were described as sandy silt. The fines content in the fill ranged between 10 and 40 percent, and the gravel content ranged between 0 and 25 percent. When described as silt, the sand content in the fill ranged between 25 and 30 percent. The samples in the fill contained traces of organic soil, roots, grass, and wood.

The SPT N-values in this layer ranged between 4 blows per foot (bpf) and 13 bpf, with most values ranging between 7 bpf and 13 bpf, indicating mostly loose to medium dense material. Please note that the high SPT N-values recorded in the fill may be due to obstructions such as cobbles and boulders present in the fill and may not represent the true density of the fill.

Sand and Gravel – A layer of sand and gravel was encountered beneath the layer of fill in all borings. The sand and gravel extended to the termination depths in the borings. The samples in this layer were described mostly as well graded sand. Two (2) samples were described as silty sand, one (1) sample was described as poorly graded sand, and one (1) sample was described as well graded gravel. The fines content in this layer ranged between 5 and 30 percent, and the gravel content ranged between 0 and 45 percent. When described as gravel, the sand content ranged between 35 and 40 percent. One (1) sample contained varves of silt.



The SPT N-values in this layer ranged between 23 bpf and refusal, with most values ranging between 23 bpf and 31 bpf, indicating mostly medium dense to dense material. Please note that the high SPT N-values in the sand and gravel may be due to obstructions such as cobbles and boulders in the sand and gravel and may not represent the true density of the sand and gravel.

2.4 Groundwater

Groundwater was encountered in borings B-1 and B-2 between depths of 13.0 feet and 15.0 feet beneath the ground surface, as shown in Table 1 and in the boring logs. Groundwater was not observed in groundwater observation well B-3-OW during and short after installation. The groundwater observation well was 14.1 feet deep.

The groundwater information reported herein is based on observations made during or shortly after the completion of drilling. Therefore, the reported groundwater levels may not represent the actual groundwater conditions, as additional time may be required for the groundwater levels to stabilize. The groundwater information presented in this report only represents the conditions encountered at the time and location of the explorations. Seasonal fluctuation should be anticipated.

2.5 Laboratory Test Data

LGCI submitted two (2) soil samples collected from the borings for grain-size analysis. The results of the grain-size analyses are provided in the test data sheets included in Appendix B and are summarized in the table below:

Grain-Size Analysis Test Results

Boring No.	Sample No.	Stratum	Sample Depth (ft.)	Percent Gravel	Percent Sand	Percent Fines
B-2	S3 Top 6”	Fill	4.0 – 6.0	21.4	43.5	35.1
B-3-OW	S1	Fill	1.0 – 3.0	18.9	28.8	52.3

3. EVALUATION AND RECOMMENDATIONS

3.1 General

Based on our understanding of the proposed construction, our observation of our borings, and the results of our laboratory testing, there are a few issues that we would like to highlight for consideration and discussion.

3.1.1 Surficial Topsoil, Asphalt, and Existing Fill

- The topsoil and asphalt should be removed from within the entire construction area, including the proposed building footprint and the paved areas.

- The existing fill was observed to be variable in composition and density. In addition, the existing fill contained traces of organic soil. Existing fill that was not placed with strict moisture, density, and gradation control presents risk of unpredictable settlement that may result in poor performance of floor slabs and foundations. Due to these risks, the existing fill should be entirely removed from within the proposed elevator pit. The elevator pit should be supported on Structural Fill placed directly on top of the natural sand and gravel.

- The subgrade of footings should be prepared in accordance with the recommendations in Section 4.1.

- Within paved areas and along the proposed handicap ramps, the existing fill should be removed to the top of the natural sand and gravel or to a depth of 18 inches beneath the bottom of the proposed pavement, whichever occurs first. Where organic soil is exposed, the organic soil should be removed. The existing fill deeper than 18 inches beneath the bottom of the proposed pavement can remain in place provided these materials are firm and unyielding following proofrolling as described in Section 4.1.

3.1.2 Shallow Footings and Slabs-on-Grade

If the proposed elevator is provided within a proposed building enclosure, the enclosure should be supported of shallow foundations bearing in Structural Fill placed directly on top of the natural sand and gravel. The slab of the proposed enclosure should be designed as a slab-on-grade. Our recommendation for net allowable bearing capacity in the sand and gravel is presented in Section 3.2.1. Our recommendations for slabs-on-grade are presented in Section 3.3.1. Our recommendations for lateral pressures for the proposed elevator pit walls and other retaining walls are presented in Section 3.5. Section 4.1 provides recommendations for preparation of subgrades.



3.2 Foundation Recommendations

3.2.1 Footing Design

- We recommend entirely removing the surficial topsoil, asphalt, and the existing fill from within the proposed building footprint as described in Section 3.1.1.

- We recommend supporting the elevator enclosure on spread footings bearing on Structural Fill placed directly on the natural sand and gravel.

- We recommend designing the proposed footings using a net allowable bearing pressure of 4 kips per square foot (ksf). We recommend that the footings bear on a minimum of 12 inches of Structural Fill placed directly on top of the natural sand and gravel or on weathered rock. The Structural Fill should extend at least 1 foot laterally beyond the limits of the footings.

- Footing subgrades should be prepared in accordance with the recommendations in Section 4.1.

- Foundations should be designed in accordance with The Commonwealth of Massachusetts State Building Code 780 CMR, Ninth Edition (MSBC 9th Edition).

- Exterior footings and footings in unheated areas should be placed at a minimum depth of 4 feet below the final exterior grade to provide adequate frost protection. Interior footings in heated areas may be designed and constructed at a minimum depth of 2 feet below finished floor grades.

- Wall footings should be designed and constructed with continuous, longitudinal steel reinforcement for greater bending strength to span across small areas of loose or soft soils that may go undetected during construction.

- A representative of LGCI should be engaged to observe that the subgrade has been prepared in accordance with our recommendations.

3.2.2 Settlement Estimates

Based on our experience with similar soils and designs using a net allowable bearing pressure of 4 ksf, we anticipate that the total settlement will be approximately 1 inch, and that the differential settlement of the footings will be 3/4 inch or less over a distance of 25 feet. We believe that total and differential settlements of this magnitude are tolerable for a similar structure. However, the tolerance of the proposed structure to the predicted total and differential settlements should be assessed by the structural engineer.



3.3 Concrete Slab Considerations

3.3.1 Slabs-on-Grade

- Floor slabs should be constructed as slabs-on-grade bearing on a minimum of 12 inches of Structural Fill placed directly on top of the sand and gravel. The subgrade of the slabs should be prepared as described in Section 4.1.

- To reduce the potential for dampness in the proposed floor slab, the project architect may consider placing a vapor barrier beneath the floor slab. The vapor barrier should be protected from puncture during the placement of the proposed slab reinforcement.

- For the design of the floor slab bearing on the materials described above, we recommend using a modulus of subgrade reaction, k_{s1}, of 100 tons per cubic foot (tcf). Please note that the values of k_{s1} are for a 1 x 1 square foot area. These values should be adjusted for larger areas using the following expression:

$$Modulus\ of\ Subgrade\ \mathrm{Re}action\ (k_s) = k_{s1} * \left(\frac{B+1}{2B}\right)^2$$

where:

k_s = Coefficient of vertical subgrade reaction for loaded area;
k_{s1} = Coefficient of vertical subgrade reaction for a 1 x 1 square foot area; and
B = Width of area loaded, in feet.

Please note that cracking of slabs-on-grade can occur as a result of heaving or compression of the underlying soil, but also as a result of concrete curing stresses. To reduce the potential for cracking, the precautions listed below should be closely followed during the construction of all slabs-on-grade:

- Construction joints should be provided between the floor slab and the walls and columns in accordance with the American Concrete Institute (ACI) requirements, or other applicable code.

- The backfill in interior utility trenches should be properly compacted.

- In order for the movement of exterior slabs not to be transmitted to foundations or superstructures, exterior slabs, such as approach slabs and sidewalks, should be isolated from the superstructure.



3.3.2 Under-slab Drains and Waterproofing

The finished floor elevation (FFE) of the proposed ground floor was not provided to us. However, assuming that the propose FFE matches the existing grades, an understand drainage system would not be required beneath the proposed floor slab. The elevator pit should be designed to be waterproof to protect against surface water and runoff that may infiltrate through the soil.

3.4 Seismic Design

Based on the SPT N-values from the borings, we estimate that the seismic criteria for the site are as follows:

- Site Class: D
- Spectral Response Acceleration at short period (Ss): 0.180g
- Spectral Response Acceleration at 1 sec. (S_1): 0.066g
- Site Coefficient Fa (Table 1613.5.3(1)): 1.6
- Site Coefficient Fv (Table 1613.5.3(2): 2.4
- Adjusted spectral response S_{MS}: 0.288g
- Adjusted spectral response S_{M1}: 0.158g

Based on the SPT data from the borings, the site soils are not susceptible to liquefaction.

3.5 Lateral Pressures for Wall Design

3.5.1 Lateral Earth Pressures

Lateral earth pressures for the design of elevator pit walls, and site retaining walls, if any, are provided below.

Coefficient of Active Earth Pressure, K_A:	0.31
Coefficient of At-Rest Earth Pressure, K_o:	0.47
Coefficient of Passive Earth Pressure, K_p:	3.25
Total Unit Weight γ:	125 pcf

Note: The values in the table are based on a friction angle for the backfill of 32 degrees and neglecting friction between the backfill and the wall. The design active and passive coefficients are based on horizontal surfaces (non-sloping backfill) on both the active and passive sides, and on a vertical wall face.

- Exterior walls of below-ground spaces and other retaining walls braced at the top to restrain movement/rotation, should be designed using the "at-rest" pressure coefficient.

- We recommend placing free-draining material within the 3 feet immediately behind retaining walls.



- We recommend providing weep holes at the bottom of site retaining walls, including temporary SOE systems, to promote drainage where possible. Alternatively, a pipe should be placed at the base of the wall to collect the water. Groundwater collected by the wall drains should be discharged into a lower area if gravity flow is possible.

- Passive earth pressures should only be used at the toe of the wall where special measures or provisions are taken to prevent the disturbance or future removal of the soil on the passive side of the wall, or in areas where the wall design includes a key. In any case, the passive pressures should be neglected in the top 4 feet.

- Where a permanent vertical uniform load will be applied to the active side immediately adjacent to the wall, a horizontal surcharge load equal to half of the uniform vertical load should be applied over the height of the wall. At a minimum, a temporary lateral construction surcharge load of 100 pounds per square foot (psf) should be applied uniformly over the height of the wall.

- We recommend using an ultimate friction factor of 0.5 between the weathered rock and the bottom of the wall. Below-grade walls should be designed for minimum factors of safety of 1.5 for sliding and 2.0 for overturning.

3.5.2 Seismic Pressures

In accordance with the Massachusetts State Building Code, 9th Edition (MSBC 9th Edition), Section 1610, a lateral earthquake force equal to $0.100*(S_s)*(F_a)*\gamma*H^2$ should be included in the design of the walls (for horizontal backfill), where S_s is the maximum considered earthquake spectral response acceleration (defined in Section 3.4), F_a is the site coefficient (defined in Section 3.4), γ is the total unit weight of the soil backfill, and H is the height of the wall.

The earthquake force should be distributed as an inverted triangle over the height of the wall. In accordance with MSBC 9th Edition, Section 1610.2, a load factor of 1.43 should be applied to the earthquake force for wall strength design.

Temporary surcharges should not be included when designing for earthquake loads. Surcharge loads applied for extended periods of time should be included in the total static lateral soil pressure, and their earthquake lateral force should be computed and added to the force determined above.

3.6 Parking Lots, Driveways, Sidewalks, and Ramps

3.6.1 General

The subsurface conditions encountered at the site are generally suitable to support the proposed driveways, parking lots, sidewalks, and ramps after preparation of the subgrade as described in Section 4.1.



- We recommend entirely removing the topsoil from within the footprint of the proposed driveways and parking lots.

- The existing fill and subsoil should be improved in accordance with the recommendations in Section 4.1.

- Cobbles and boulders should be removed to at least 18 inches below the bottom of the pavement.

3.6.2 Sidewalks

- Sidewalks should be placed on a minimum of 12 inches of Structural Fill with less than 5 percent fines.

- To reduce the potential for heave caused by surface water penetrating under the sidewalk, the joints between sidewalk concrete sections should be sealed with a waterproof compound. The sidewalks should be sloped away from the building or other vertical surfaces to promote the flow of water. To the extent possible, roof leaders should not discharge onto sidewalk surfaces.

3.6.3 Pavement Sections

A typical, minimum, standard-duty pavement section that could be used for parking areas is as follows:

1.5" Asphalt "Top Course"
2.0" Asphalt "Base Course"
8" Processed Gravel for Sub-Base (MassDOT M1.03.1)

A typical, minimum, heavy-duty pavement section that could be used for areas of heavy truck traffic is as follows:

2.0" Asphalt "Top Course"
2.5" Asphalt "Base Course"
12" Processed Gravel for Sub-Base (MassDOT M1.03.1)

The pavement sections shown above represent minimum thicknesses representative of typical local construction practices for similar use. Periodic maintenance should be anticipated.

Pavement material types and construction procedures should conform to specifications of the “Standard Specifications for Highways and Bridges,” prepared by the Commonwealth of Massachusetts Department of Transportation dated 2023.



Areas to receive relatively highly concentrated, sustained loads such as dumpsters, loading areas, and storage bins are typically installed over a rigid pavement section to distribute concentrated loads and reduce the possibility of high stress concentrations on the subgrade. Typical rigid pavement sections consist of 6 inches of concrete placed over a minimum of 12 inches of subbase material.



4. CONSTRUCTION CONSIDERATIONS

4.1 Subgrade Preparation

- Asphalt, topsoil, organic materials, existing fill, buried organic soil, buried subsoil, abandoned utilities, buried foundations, and other below-ground structures should be entirely removed from within the footprint of the proposed elevator pit and site structures, if any.

- Tree stumps, root balls, and roots larger than ½ inch in diameter should be removed and the cavities filled with suitable material and compacted per Section 4.3 of this report.

- Cobbles and boulders should be removed at least 6 inches from beneath footings and 18 inches beneath the bottom of slabs and paved areas. The resulting excavations should be backfilled with compacted Structural Fill under the building and with Ordinary Fill under the subbase of paved areas.

- The bottom of the excavation resulting from the removal of the existing fill and subsoil, or natural soil should be compacted with a dynamic vibratory compactor imparting a minimum of 10 kips of force to the subgrade.

- The base of the footing excavations in granular soil should be compacted with a dynamic vibratory compactor weighing at least 200 pounds and imparting a minimum of 4 kips of force to the subgrade.

- After the surficial materials are removed to a depth of 18 inches within the proposed paved areas, walkways, and ramps in accordance with the recommendations in Section 3.1, the exposed existing fill deeper than 18 inches beneath the bottom of the proposed pavement or ramp concrete should be improved by compacting the exposed surface with at least six (6) passes of a vibratory roller compactor imparting a dynamic effort of at least 10 kips. Where soft zones of soil are observed, the soft soil should be removed, and the grade should be restored using Ordinary Fill to the bottom of the proposed subbase layer. If pumping of the existing fill deeper than 18 inches beneath the bottom of the proposed pavement is observed, the soft and/or pumping material should be removed and replaced.

- Fill placed within the footprint of the proposed buildings should meet the gradation and compaction requirements of Structural Fill, shown in Section 4.3.1.

- Fill placed under the subbase of paved areas should meet the gradation and compaction requirements of Ordinary Fill, shown in Section 4.3.2.

- Fill placed in the top 12 inches beneath sidewalks and ramps should consist of Structural Fill with less than 5 percent fines.



- Loose or soft soils identified during the compaction of the footing or floor slab subgrades should be excavated to a suitable bearing stratum, as determined by the representative of LGCI. Grades should be restored by backfilling with Structural Fill or crushed stone.

- When crushed stone is required in the drawings or is used for the convenience of the contractor, it should be wrapped in a geotextile fabric for separation except where introduction of the geotextile fabric promotes sliding. A geotextile fabric should not be placed between the bottoms of the footings and the crushed stone.

- An LGCI representative should observe the exposed subgrades prior to fill and concrete placement to verify that the exposed bearing materials are suitable for the design soil bearing pressure. If soft or loose pockets are encountered in the footing excavations, the soft or loose materials should be removed and the bottom of the footing should be placed at a lower elevation on firm soil, or the resulting excavation should be backfilled with Structural Fill, or crushed stone wrapped in a filter fabric.

4.2 Subgrade Protection

The onsite fill and natural soils are frost susceptible. If construction takes place during freezing weather, special measures should be taken to prevent the subgrade from freezing. Such measures should include the use of heat blankets or excavating the final 6 inches of soil just before pouring the concrete. Footings should be backfilled as soon as possible after footing construction. Soil used as backfill should be free of frozen material, as should the ground on which it is placed. Filling operations should be halted during freezing weather.

Materials with high fines contents are typically difficult to handle when wet, as they are sensitive to moisture content variations. Subgrade support capacities may deteriorate when such soils become wet and/or disturbed. The contractor should keep exposed subgrades properly drained and free of ponded water. Subgrades should be protected from machine and foot traffic to reduce disturbance.

4.3 Fill Materials

Structural Fill and Ordinary Fill should consist of inert, hard, durable sand and gravel free from organic matter, clay, surface coatings, and deleterious materials, and should conform to the gradation requirements shown below.

4.3.1 Structural Fill

The Structural Fill should have a plasticity index of less than 6 and should meet the gradation requirements shown below. Structural Fill should be compacted in maximum 9-inch loose lifts to at least 95 percent of the Modified Proctor maximum dry density (ASTM D1557), with moisture contents within ±2 percentage points of the optimum moisture content.



Sieve Size Percent	Passing by Weight
3 inches	100
1 ½ inch	80-100
½ inch	50-100
No. 4	30-85
No. 20	15-60
No. 60	5-35
No. 200*	0-10

* 0 – 5 for the top 12 inches under sidewalks, exterior slabs, pads, and walkways

4.3.2 Ordinary Fill

Ordinary Fill should have a plasticity index of less than 6 and should meet the gradation requirements shown below. Ordinary Fill should be compacted in maximum 9-inch loose lifts to at least 95 percent of the Modified Proctor maximum dry density (ASTM D1557), with moisture contents within ±2 percentage points of the optimum moisture content.

Sieve Size Percent	Passing by Weight
6 inches	100
1 inch	50-100
No. 4	20-100
No. 20	10-70
No. 60	5-45
No. 200	0-20

4.4 Reuse of Onsite Materials

Based on our field observations and the results of the grain-size analyses, the onsite fill is too silty and does not meet the gradation requirements for Ordinary Fill or Structural Fill. The existing fill can be used in landscaped areas.

The contractor should avoid mixing the reusable soils with fine-grained and/or organic soils. The soils to be reused should be excavated and stockpiled separately for compliance testing. Soils with 20 percent or greater fines contents are generally very sensitive to moisture content variations and are susceptible to frost. Such soils are very difficult to compact at moisture contents that are much higher or much lower than the optimum moisture content determined from the laboratory compaction test. Therefore, strict moisture control should be implemented during the compaction of onsite soils with fines contents of 20 percent or greater. The contractor should be prepared to remove and replace such soils if pumping occurs.

Suitable imported material and amended/improved onsite materials should be stockpiled separately from unimproved onsite soils.



Materials to be used as fill should first be tested for compliance with the applicable gradation specifications.

4.5 Groundwater Control Procedures

Based on the groundwater levels measured in our borings and groundwater observation well, we do not anticipate major groundwater control procedures during construction. We anticipate that filtered deep sump pumps and sump pumps installed in a series of pits located at least 3 feet below the bottom of planned excavations may be sufficient to handle groundwater and surface runoff that may enter the excavation during wet weather. The contractor should be prepared to use multiple sump pumps to maintain dry excavations during the removal of the existing fill.

The contractor should be permitted to employ whatever commonly accepted means and practices are necessary to maintain the groundwater level below the bottom of the excavation and to maintain a dry excavation during wet weather. Groundwater levels should be maintained at a minimum of 1 foot below the bottom of the excavations during construction. The placement of reinforcing steel or concrete in standing water should not be permitted.

To reduce the potential for sinkholes developing over sump pump pits after the sump pumps are removed, the crushed stone placed in the sump pump pits should be wrapped in a geotextile fabric. Alternatively, the crushed stone should be entirely removed after the sump pump is no longer in use, and the sump pump pit should be restored with suitable backfill.

4.6 Temporary Excavations

All excavations to receive human traffic should be constructed in accordance with OSHA guidelines.

The site soil should generally be considered Type “C” and should have a maximum allowable slope of 1.5 Horizontal to 1 Vertical (1.5H:1V) for excavations less than 20 feet deep. Deeper excavations, if needed, should have shoring designed by a professional engineer.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain the stability of the excavation sides and bottom.



5. REPORT LIMITATIONS

Our analyses and recommendations are based on project information provided to us at the time of this report. If changes to the type, size, and location of the proposed structures or to the site grading are made, the recommendations contained in this report shall not be considered valid unless the changes are reviewed, and the conclusions and recommendations modified in writing by LGCI. LGCI cannot accept responsibility for designs based on our recommendations unless we are engaged to review the final plans and specifications to determine whether any changes in the project affect the validity of our recommendations, and whether our recommendations have been properly implemented in the design.

It is not part of our scope to perform a more detailed site history; therefore, we have not explored or researched the locations of buried utilities or other structures in the area of the proposed construction. Our scope did not include environmental services or services related to moisture, mold, or other biological contaminants in or around the site.

The recommendations in this report are based in part on the data obtained from the subsurface explorations. The nature and extent of variations between explorations may not become evident until construction. If variations from anticipated conditions are encountered, it may be necessary to revise the recommendations in this report. We cannot accept responsibility for designs based on recommendations in this report unless we are engaged to 1) make site visits during construction to check that the subsurface conditions exposed during construction are in general conformance with our design assumptions and 2) ascertain that, in general, the work is being performed in compliance with the contract documents.

Our report has been prepared in accordance with generally accepted engineering practices and in accordance with the terms and conditions set forth in our agreement. No other warranty, expressed or implied, is made. This report has been prepared for the exclusive use of Mount Vernon Group Architects, Inc. for the Proposed Improvements for Lincoln Street Elementary School in Worcester, Massachusetts as conceived at this time.



6. REFERENCES

In addition to the references included in the text of the report, we used the following references:

American Society of Civil Engineers, "Minimum Design Loads and Associated Criteria for Buildings and Other Structures," ASCE/SEI 7-16, 2017.

The Commonwealth of Massachusetts (2017), "The Massachusetts State Building Code, Ninth (9^{th}) Edition."

The Department of Labor, Occupational Safety and Health Administration (1989), "Occupational Safety and Health Standards - Excavations; Final Rule," 20 CFR Part 1926, Subpart P.

USGS Worcester, MA topographic map from http://mapserver.mytopo.com.



Table 1 - Summary of LGCI's Borings
Proposed Improvements - Lincoln Street Elementary School
Worcester, MA
LGCI Project No. 2423

Boring No.	Ground Surface Elevation (ft.)[1]	Groundwater[2] Depth / El. (ft.)	Bottom of Topsoil / **Asphalt** Depth / El. (ft.)	Bottom of Fill Depth / El. (ft.)	Bottom of Sand and Gravel Depth / El. (ft.)	Bottom of Boring Depth / El. (ft.)
B-1	537.0	15.0 / **522.0**	2.0 / **535.0**	4.3 / **532.7**	17.0 [3]/ **520.0**	17.0 / **520.0**
B-2	536.0	13.0 / **523.0**	0.9 / **535.1**	4.5 / **531.5**	14.0 [3]/ **522.0**	14.0 / **522.0**
B-3	538.0	- / **-**	**0.5** / **537.5**	7.0 / **531.0**	14.1 [3]/ **523.9**	14.1 / **523.9**

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Existing Conditions Plan, 549 Lincoln Street, Worcester, Massachusetts (Worcester County)," prepared by Brennan Consulting, dated August 14, 2024, and provided to LGCI via e-mail on August 20, 2024.
2. Groundwater was measured during drilling, at the end of drilling, after drilling, or based on sample moisture whichever is shallower.
3. Boring terminated in the sand and gravel layer.
4. "-" means groundwater was not encountered.



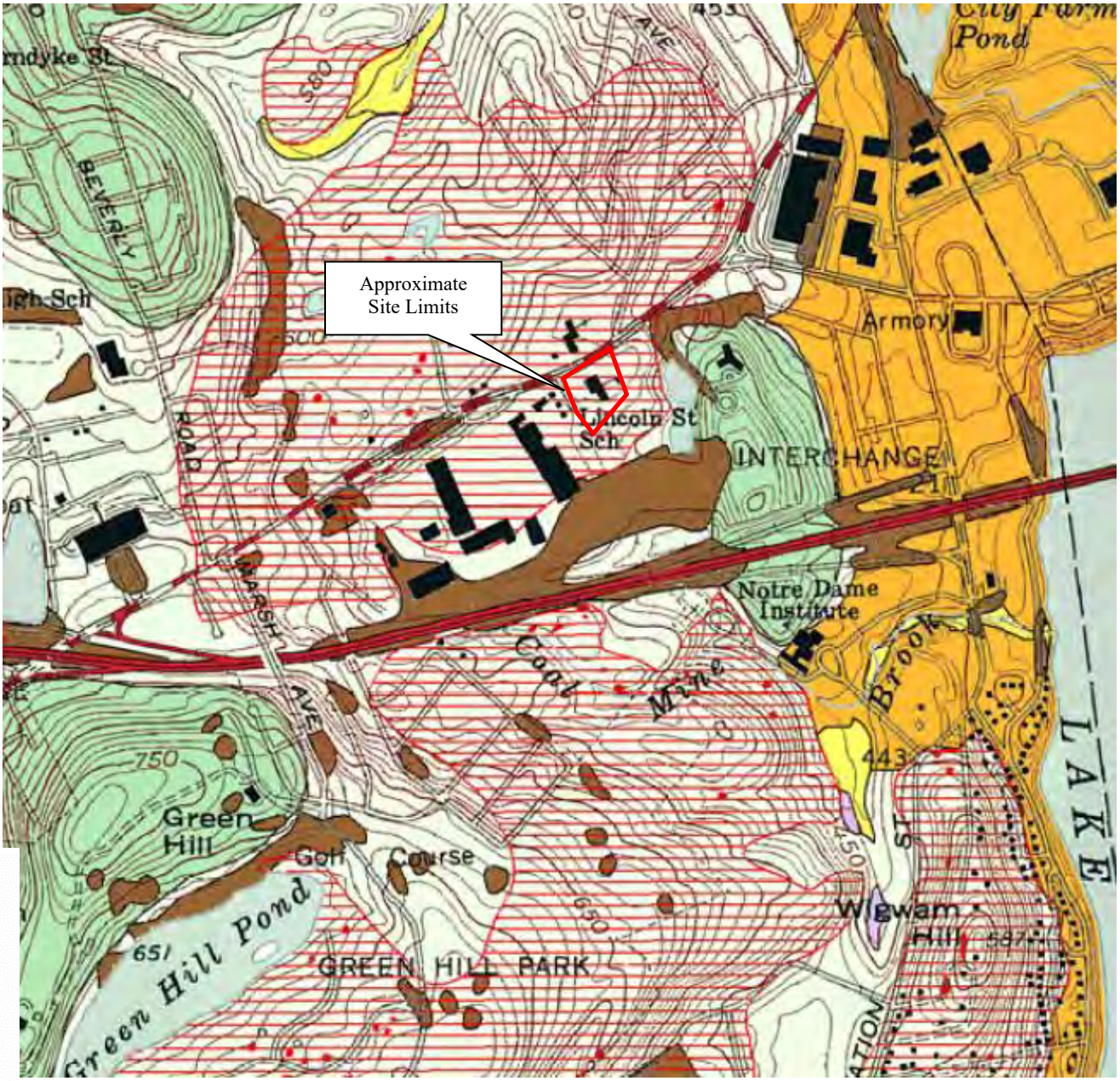
N

Contour Intervals: 3 meters

0.2 mi

Note: Figure based on USA Topo Maps of Worcester, MA *ngmdb.usgs.gov/topoview/viewer*

Client:	Project:	Figure 1 – Site Location Map	
Mount Vernon Group Architects, Inc.	Proposed Improvements – Lincoln Street Elementary School		
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Worcester, MA	LGCI Project No.: 2423	Date: Sept. 2024



Thin till—Nonsorted, nonstratified matrix of sand, some silt, and little clay containing scattered pebble, cobble, and boulder clasts; large surface boulders are common; unit was mapped where till is generally less than 10 to 15 ft thick including areas of shallow bedrock. Predominantly consists of upper till of the last glaciation; loose to moderately compact, generally sandy, commonly stony. Two facies are present in some places: a looser, coarser grained ablation facies, melted out from supraglacial position; and an underlying more compact, finer grained lodgement facies deposited subglacially. In general, both ablation and lodgement facies of upper till derived from fine-grained bedrock are finer grained, more compact, less stony and have fewer surface boulders than upper till derived from coarse-grained crystalline rocks. Across Massachusetts, fine-grained bedrock sources include the red Mesozoic sedimentary rocks of the Connecticut Valley lowland, marble in the western river valleys, and fine-grained schists in upland areas

Bedrock outcrops and areas of abundant outcrop or shallow bedrock—Solid color shows extent of individual bedrock outcrops; horizontal-line pattern indicates areas of shallow bedrock or areas where small outcrops are too numerous to map individually; in areas of shallow bedrock, surficial materials are less than 5 to 10 ft thick. These units were not mapped consistently among all quadrangles; see note at beginning of appendix 1 for information on bedrock outcrop mapping by quadrangle

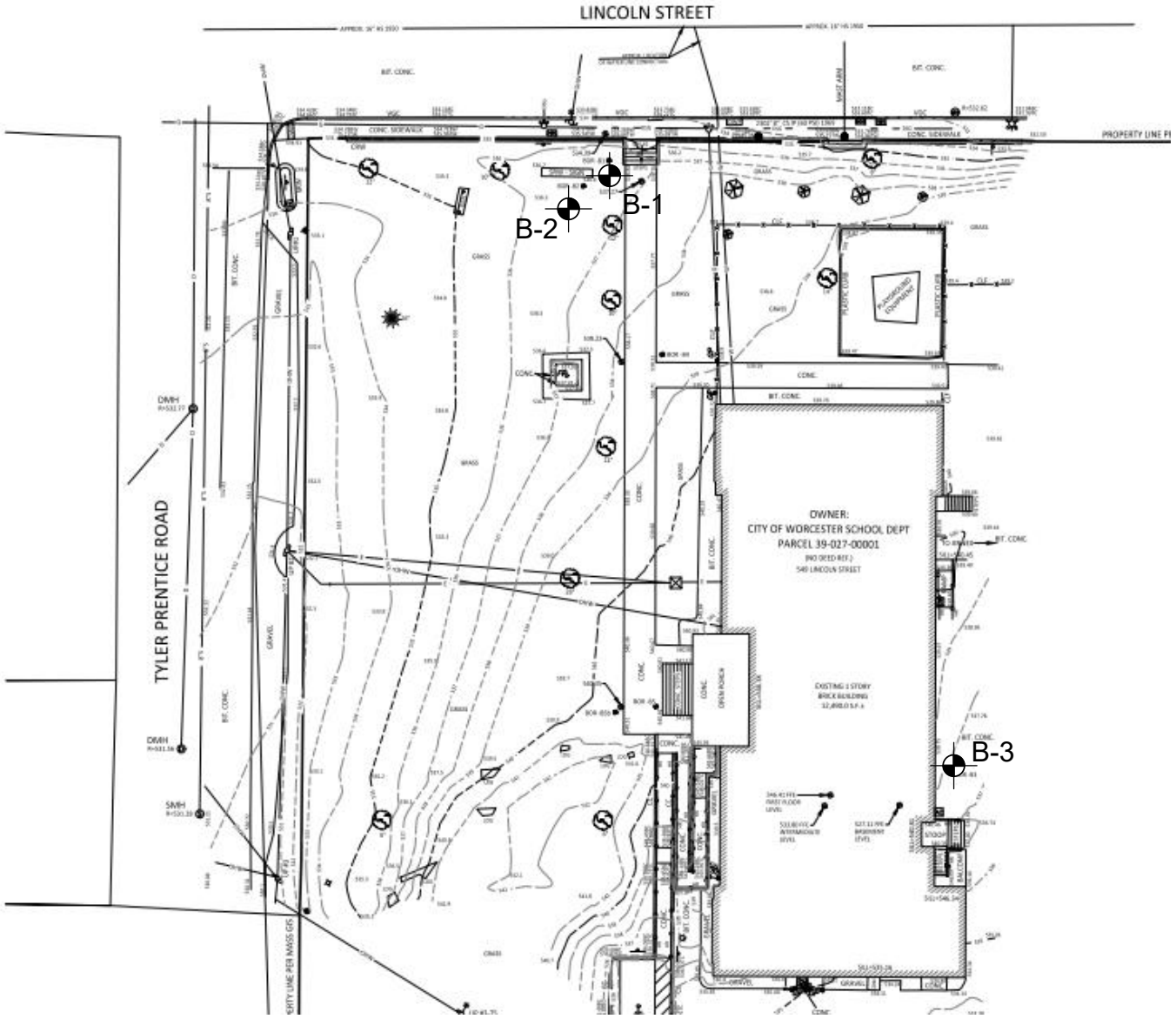
Note: Figure based on map titled: "Surficial Materials Map of the Worcester North Quadrangle, Massachusetts," prepared by Stone B.D., Stone J.R., and DiGiacomo-Cohen M.L., Scientific Investigation Map 3402, Quadrangle 80 – Worcester North, 2018.

Client:	Project	Figure 2 – Surficial Geologic Map	
Mount Vernon Group Architects, Inc.	Proposed Improvements – Lincoln Street Elementary School		
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Worcester, MA	LGCI Project No.: 2423	Date: Sept. 2024

Legend

Approximate location of borings advanced by Soil X, Corp. of Leominster, MA on July 23, 2024, and observed by Lahlaf Geotechnical Consulting, Inc. (LGCI).





Approximate Scale (ft.)

40 0 20 40 80

Note

Figure based on drawing titled: "Existing Conditions Plan, 549 Lincoln Street, Worcester, Massachusetts (Worcester County)," prepared by Brennan Consulting, dated August 14, 2024, and provided to LGCI by Mount Vernon Group Architects, Inc., via e-mail on August 20, 2024.

Client: Mount Vernon Group Architects, Inc.	Project: Proposed Improvements – Lincoln Street Elementary School	Figure 3 – Boring Location Plan	
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Worcester, MA	LGCI Project No.: 2423	Date: Sept. 2024

Appendix A – LGCI's Boring Logs

LGCI Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Rd Suite 2
Billerica, MA 01862
Telephone: 9783305912
Fax: 9783305056

BORING LOG

B-1
PAGE 1 OF 1

CLIENT: Mount Vernon Group Architects, Inc.
PROJECT NAME: Prop. Improvements - Lincoln Street Elementary School
LGCI PROJECT NUMBER: 2423
PROJECT LOCATION: Worcester, MA

DATE STARTED: 7/23/24 **DATE COMPLETED:** 7/23/24
BORING LOCATION: West of proposed ramp
COORDINATES: NA
SURFACE El.: 537 ft. (see note 1) **TOTAL DEPTH:** 17 ft.
WEATHER: 70's / Cloudy
GROUNDWATER LEVELS:
DURING DRILLING: 15.0 ft. / El. 522.0 ft. Based on sample moisture
AT END OF DRILLING: 15.0 ft. / El. 522.0 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Soil X, Corp.
DRILLING FOREMAN: Jose Valentin
DRILLING METHOD: Hollow Stem Auger (4-1/4" I.D.)
DRILL RIG TYPE/MODEL: Mobile B-57 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: MBH **CHECKED BY:** EP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0							
	535.0	2	S1	2-2-5-10 (7)	24/13		Topsoil	2.0 535.0	S1 - Topsoil
		4	S2	11-7-6-7 (13)	24/0		Fill	4.3 532.7	S2 - No recovery
5		6	S3	7-10-16-15 (26)	24/15				S3 - Top 3": Silty SAND (SM), fine to medium, 15-20% fines, 0-5% fine subangular gravel, trace of roots, trace of organic soil, brown, moist Bot. 12": Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 10-15% fines, 25-30% fine to coarse subangular gravel, brown, moist
	530.0	8	S4	17-18-13-11 (31)	24/2				S4 - Similar to S3 Bot. 12", 0-5% fine to coarse subangular gravel
10		10	S5	10-17-29-23 (46)	24/13		Sand and Gravel		S5 - Well Graded GRAVEL with Silt and Sand (GW-GM), fine to coarse, subangular, 5-10% fines, 35-40% fine to coarse sand, brown, moist
	525.0	12				1			REMARK 1: Auger chattering observed at a depth of 13 feet.
15		15	S6	9-16-8-12 (24)	24/8				S6 - Silty SAND with Gravel (SM), fine to coarse, 25-30% fines, 20-25% fine to coarse angular gravel, brown, wet
	520.0	17						17.0	Bottom of borehole at 17.0 feet. Borehole backfilled using drill cuttings.
20									
	515.0								
25									

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Existing Conditions Plan, 549 Lincoln Street, Worcester, Massachusetts (Worcester County)," prepared by Brennan Consulting, dated August 14, 2024, and provided to LGCI via e-mail on August 20, 2024.

LGCI Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Rd Suite 2
Billerica, MA 01862
Telephone: 9783305912
Fax: 9783305056

BORING LOG

B-2
PAGE 1 OF 1

CLIENT: Mount Vernon Group Architects, Inc.
PROJECT NAME: Prop. Improvements - Lincoln Street Elementary School
LGCI PROJECT NUMBER: 2423
PROJECT LOCATION: Worcester, MA

DATE STARTED: 7/23/24 **DATE COMPLETED:** 7/23/24
BORING LOCATION: West of proposed ramp
COORDINATES: NA
SURFACE El.: 536 ft. (see note 1) **TOTAL DEPTH:** 14 ft.
WEATHER: 80's / Cloudy
GROUNDWATER LEVELS:
DURING DRILLING: Not Encountered
AT END OF DRILLING: 13.0 ft. / El. 523.0 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Soil X, Corp.
DRILLING FOREMAN: Jose Valentin
DRILLING METHOD: Hollow Stem Auger (4-1/4" I.D.)
DRILL RIG TYPE/MODEL: Mobile B-57 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: MBH **CHECKED BY:** EP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
	535.0	0	S1	1-3-9-10 (12)	24/14		Topsoil	0.9 / 535.1	S1 - Top 11": Topsoil Bot. 3": Silty SAND with Gravel (SM), fine to coarse, ~15% fines, 20-25% fine to coarse subangular gravel, trace of roots, brown, moist
		2	S2	6-3-4-4 (7)	24/1		Fill		S2 - Poorly Graded SAND with Silt (SP-SM), fine to medium, 10-15% fines, 0-5% fine subangular gravel, trace of roots, trace of wood, brown, moist
5		4	S3	14-14-11-12 (25)	24/12			4.5 / 531.5	S3 - Top 6": Silty SAND with Gravel (SM), fine to coarse, 35-40% fines, 20-25% fine to coarse subangular gravel, trace of roots, trace of grass clippings, brown, moist Bot. 6": Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, ~10% fines, 40-45% fine to coarse subangular gravel, brown to light brown, moist
	530.0	6	S4	15-23-29-19 (52)	24/12				S4 - Similar to S3 Bot. 6", 25-30% fine to coarse subangular gravel
		8				1	Sand and Gravel		REMARK 1: Auger chattering observed at a depth of 8 feet.
10		10	S5	17-12-12-23 (24)	24/5				S5 - Poorly Graded SAND with Silt (SP-SM), fine to medium, trace coarse, 5-10% fines, 5-10% fine subangular gravel, varves of silt, brown, moist
	525.0	12							
		14	S6	110/0"	0/0	2		14.0	REMARK 2: Auger and split spoon refusal on possible boulder or rock at a depth of 14 feet. S6 - No recovery Bottom of borehole at 14.0 feet. Borehole backfilled using drill cuttings.
15									
	520.0								
20									
	515.0								
25									

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Existing Conditions Plan, 549 Lincoln Street, Worcester, Massachusetts (Worcester County)," prepared by Brennan Consulting, dated August 14, 2024, and provided to LGCI via e-mail on August 20, 2024.

LGCI
Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Rd Suite 2
Billerica, MA 01862
Telephone: 9783305912
Fax: 9783305056

BORING LOG

B-3-OW
PAGE 1 OF 1

CLIENT: Mount Vernon Group Architects, Inc.
PROJECT NAME: Prop. Improvements - Lincoln Street Elementary School
LGCI PROJECT NUMBER: 2423
PROJECT LOCATION: Worcester, MA

DATE STARTED: 7/23/24 **DATE COMPLETED:** 7/23/24
BORING LOCATION: Near eastern edge of exising school
COORDINATES: NA
SURFACE El.: 538 ft. (see note 1) **TOTAL DEPTH:** 14.1 ft.
WEATHER: 80's / Raining
GROUNDWATER LEVELS:
DURING DRILLING: Not Encountered
AT END OF DRILLING: Not Encountered
OTHER: -

DRILLING SUBCONTRACTOR: Soil X, Corp.
DRILLING FOREMAN: Jose Valentin
DRILLING METHOD: Hollow Stem Auger (4-1/4" I.D.)
DRILL RIG TYPE/MODEL: Mobile B-57 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: MBH **CHECKED BY:** EP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Material Description
							Asphalt (0.5 / 537.5)	Asphalt
	535.0	1–3	S1	5-4-4-4 (8)	24/8		Fill	S1 - Sandy SILT with Gravel (ML), non-plastic, 25-30% fine to coarse sand, 15-20% fine subangular gravel, brown, moist (appears to be reworked)
5		3–5	S2	8-4-3-3 (7)	24/0			S2 - No recovery
		5–7	S3	3-2-2-5 (4)	24/8			S3 - Sandy SILT with Gravel (ML), non-plastic, 25-30% fine to coarse sand, 15-20% fine subangular gravel, brown, moist (appears to be reworked)
	530.0	7–9	S4	9-10-13-27 (23)	24/19		Sand and Gravel (7.0 / 531.0)	S4 - Silty SAND (SM), fine to coarse, 20-25% fines, 5-10% fine subangular gravel, olive gray, moist
10		10–10.6	S5	52-50/1" (50/1")	7/1	1, 2		REMARK 1: Split spoon head bent closed on possible boulder at a depth of 10 feet. S5 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 10-15% fines, 25-30% fine to coarse subangular gravel, gray, moist REMARK 2: Auger chattering observed from a depth of 11 feet to a depth of 14 feet.
	525.0	14–14.1	S6	100/1"	1/0	3	(14.1)	REMARK 3: Auger and split spoon refusal on possible rock at a depth of 14 feet. S6 - No recovery Bottom of borehole at 14.1 feet. Groundwater observation well installed in borehole.
15								
	520.0							
20								
	515.0							
25								

GENERAL NOTES:

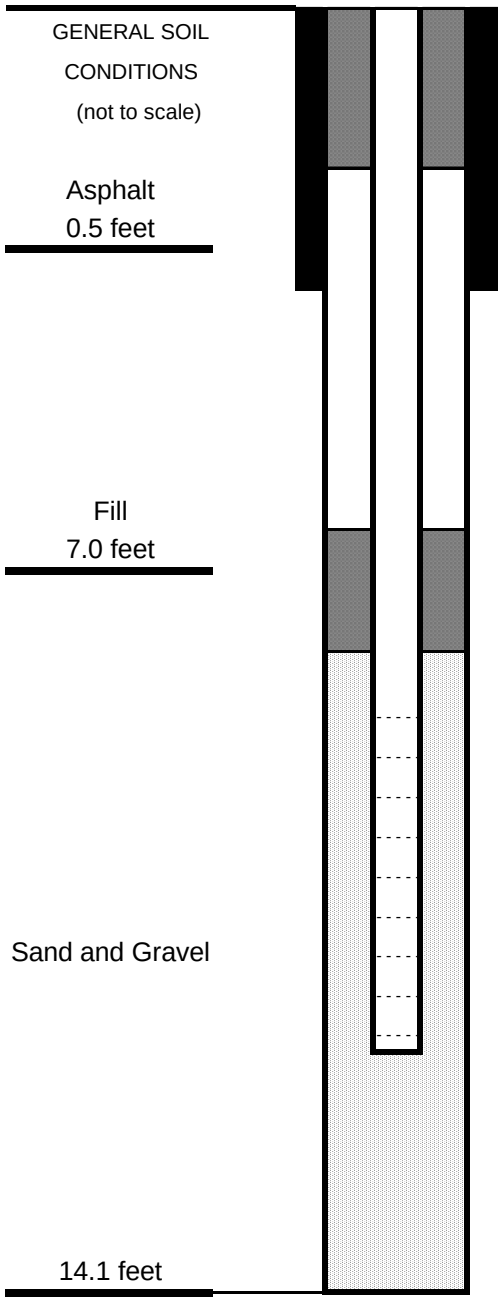
1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Existing Conditions Plan, 549 Lincoln Street, Worcester, Massachusetts (Worcester County)," prepared by Brennan Consulting, dated August 14, 2024, and provided to LGCI via e-mail on August 20, 2024.

LGCI
Lahlaf Geotechnical Consulting, Inc.

GROUNDWATER OBSERVATION WELL INSTALLATION REPORT

Boring No. : **B-3-OW**

Project Name: **Prop. Improvements - Lincoln Street Elementary School, Worcester, MA**	
LGCI Project Number: **2423**	
Client: **Mount Vernon Group Architects, Inc.**	
Drilling Subcontractor: Soil X	Date Started: 7/23/24
Drilling Foreman: Jose Valentin	Date Completed: 7/23/24
LGCI Engineer: Mumin Berke Hatipoglu	Location: Near eastern edge of existing school
Ground Surface Elevation: 538.0 feet	Total Depth of Boring: 14.1 feet
Groundwater Depth: Not Encountered	Drill Rig Type: Mobile Drill B-57 ATV
	Drilling Method: Hollow Stem Auger (4-1/4" I.D.)



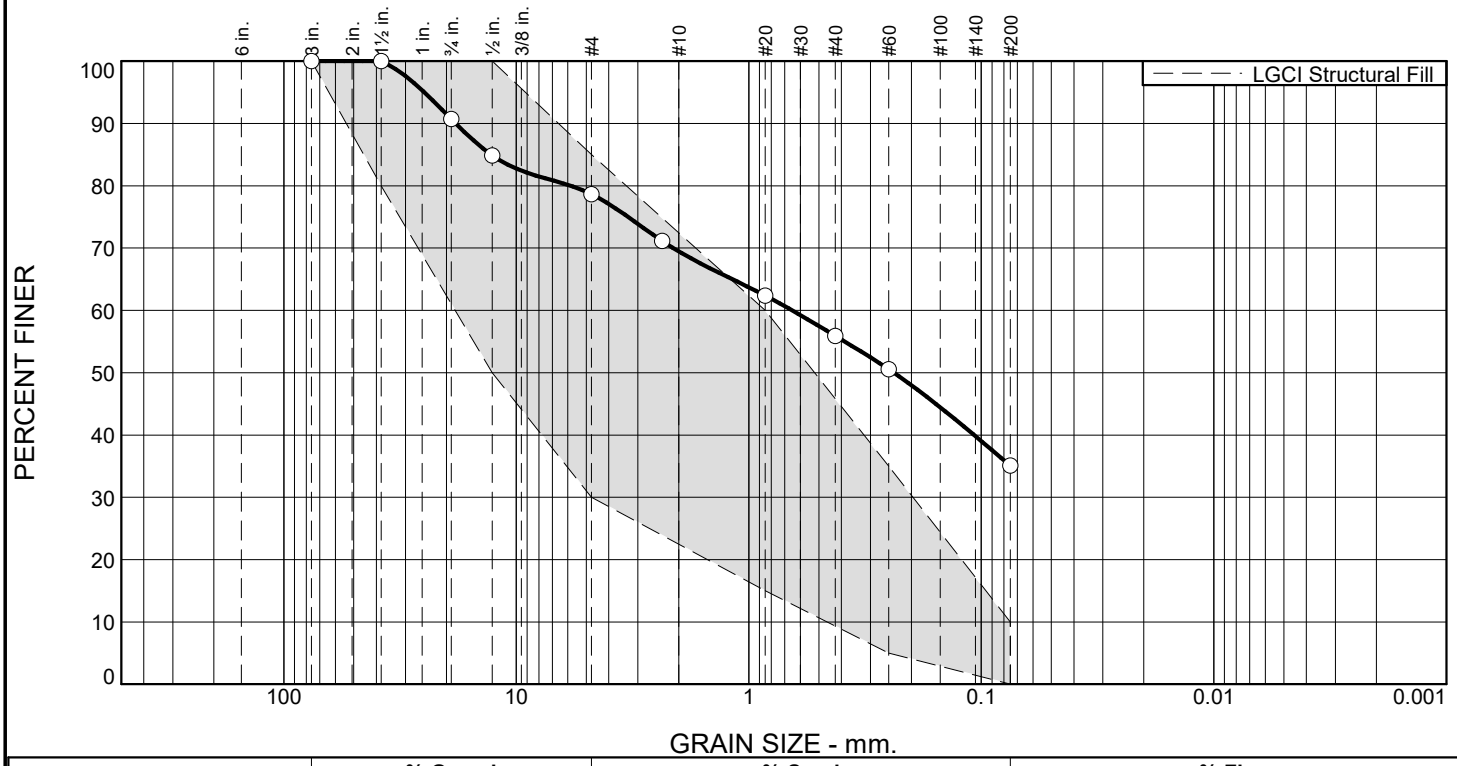
Riser Stickup 0.0 feet above ground surface

THICKNESS OF SURFACE SEAL	0.5 feet
TYPE OF SURFACE SEAL	Concrete
TYPE OF SURFACE CASING	Roadway Box
ID OF SURFACE CASING	5 inch
DEPTH TO BOTTOM OF CASING	0.8 feet
ID OF RISER PIPE	2 inch
TYPE OF RISER PIPE	Schedule 40 PVC
TYPE OF BACKFILL AROUND RISER PIPE	Filter sand
DEPTH TO TOP OF SEAL	6.0 feet
TYPE OF SEAL	Bentonite Chips
DEPTH TO BOTTOM OF SEAL	8.0 feet
DEPTH TO TOP OF PERVIOUS SECTION	9.0 feet
TYPE OF PERVIOUS SECTION	Schedule 40 PVC
DESCRIBE OPENINGS	0.01 inch slots
ID OF PERVIOUS SECTION	2 inch
TYPE OF BACKFILL AROUND PERVIOUS SECTION	Filter sand (Holliston sand)
DEPTH TO BOTTOM OF PERVIOUS SECTION	14.0 feet
DEPTH TO BOTTOM OF SAND COLUMN	14.1 feet
TYPE OF BACKFILL BELOW PERVIOUS SECTION	Filter sand (Holliston sand)
DIAMETER OF BOREHOLE	4 inch
DEPTH TO BOTTOM OF BOREHOLE	14.1 feet

NOTES: The ground surface elevation was interpolated to the nearest foot from drawing titled: " Existing Conditions Plan, 549 Lincoln Street, Worcester, Massachusetts (Worcester County)," prepared by Brennan Consulting, dated August 14, 2024, and provided to LGCI by Mount Vernon Group Architects, Inc. via e-mail on August 20, 2024.

Appendix B – Laboratory Test Results

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	9.3	12.1	9.1	13.6	20.8	35.1	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3	100.0	100.0	
1.5	100.0	80.0 - 100.0	
0.75	90.7		
0.5	84.9	50.0 - 100.0	
#4	78.6	30.0 - 85.0	
#8	71.1		
#20	62.4	15.0 - 60.0	X
#40	55.9		
#60	50.5	5.0 - 35.0	X
#200	35.1	0.0 - 10.0	X

* LGCI Structural Fill

Material Description

ASTM (D 2488) Classification: Silty SAND with Gravel (SM), fine to coarse, 35-40% fines, 20-25% fine to coarse subangular gravel, trace of roots, trace of grass clippings, brown

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 18.2322 D_{85}= 12.8342 D_{60}= 0.6509
D_{50}= 0.2379 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Fill sample.

Date Received: 7/24/24 **Date Tested:** 7/25/24

Tested By: SP

Checked By: JKW

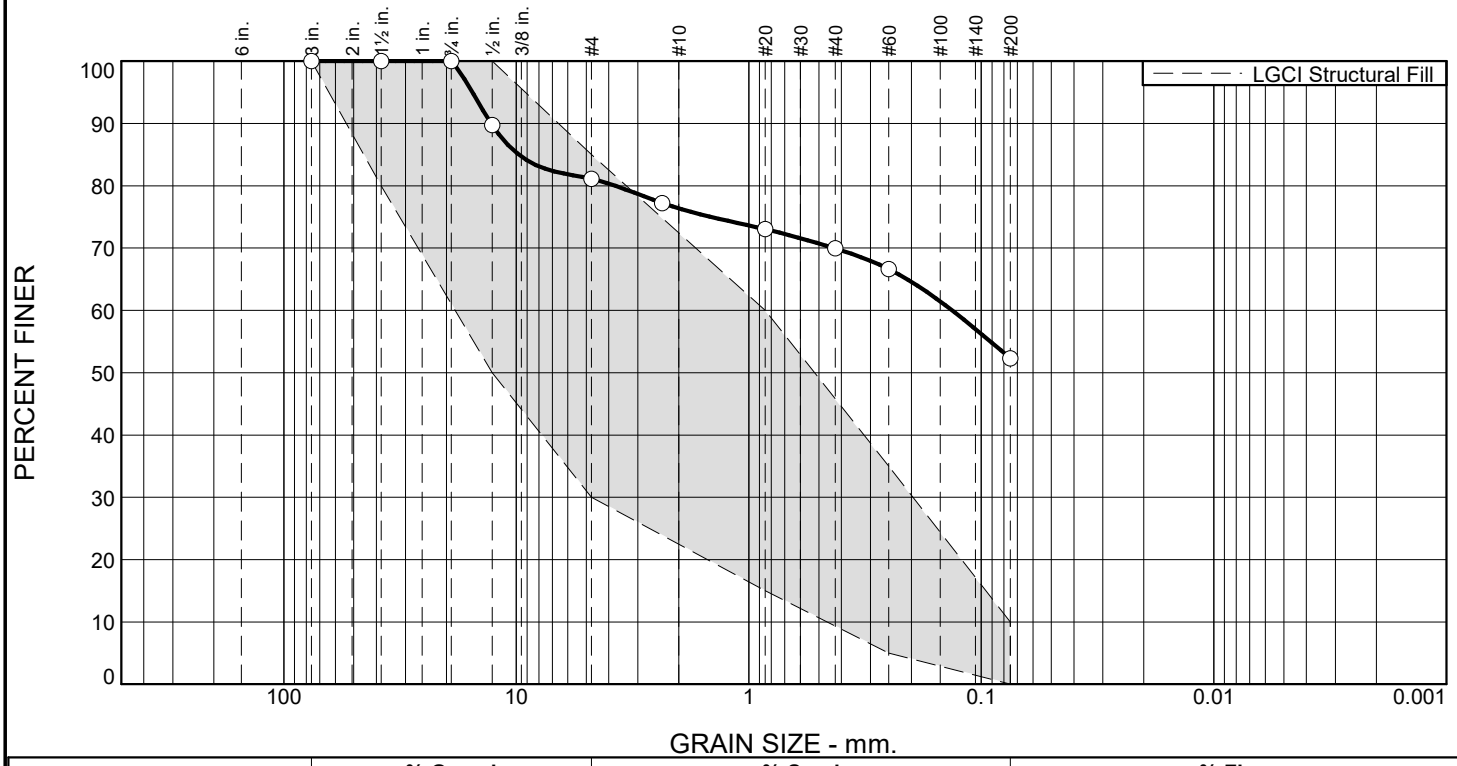
Location: Boring B-2
Sample Number: S3 Top 6" **Depth:** 4.0'-6.0'

Date Sampled: 7/23/24

LGCI
Lahlaf Geotechnical Consulting, Inc.

Client: Mount Vernon Group Architects, Inc.
Project: Proposed Improvements, Lincoln Street Elementary School, Worcester, MA
Project No: 2423 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	18.9	4.7	6.5	17.6	52.3	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3	100.0	100.0	
1.5	100.0	80.0 - 100.0	
0.75	100.0		
0.50	89.7	50.0 - 100.0	
#4	81.1	30.0 - 85.0	
#8	77.2		
#20	73.0	15.0 - 60.0	X
#40	69.9		
#60	66.6	5.0 - 35.0	X
#200	52.3	0.0 - 10.0	X

* LGCI Structural Fill

Material Description

ASTM (D 2488) Classification: Sandy SILT with Gravel (ML) , non-plastic, 25-30% fine to coarse sand, 15-20% fine subangular gravel, brown (appears to be reworked)

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 12.8316 D_{85}= 9.7403 D_{60}= 0.1334
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Fill sample.

Date Received: 7/24/24 **Date Tested:** 7/25/24

Tested By: SP

Checked By: JKW

Location: Boring B-3-OW
Sample Number: S1 **Depth:** 1.0'-3.0'

Date Sampled: 7/23/24

LGCI
Lahlaf Geotechnical Consulting, Inc.

Client: Mount Vernon Group Architects, Inc.
Project: Proposed Improvements, Lincoln Street Elementary School, Worcester, MA
Project No: 2423 **Figure**

LGCI
Lahlaf Geotechnical Consulting, Inc.

September 6, 2024

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Direct: (781) 213-5040
E-mail: bpeters@mvgarchitects.com

Re: **Geotechnical Report**
Proposed Improvements –
Thorndyke Road Elementary School
Worcester, Massachusetts
LGCI Project No. 2424

Dear Mr. Peters:

Lahlaf Geotechnical Consulting, Inc. (LGCI) has completed a geotechnical study for the proposed improvements at the Thorndyke Road Elementary School in Worcester, Massachusetts. We are submitting our geotechnical report electronically.

The soil samples from our explorations are currently stored at LGCI for further analysis, if requested. Unless notified otherwise, we will dispose of the soil samples after three (3) months.

Thank you for choosing LGCI as your geotechnical engineer.

Very truly yours,

Lahlaf Geotechnical Consulting, Inc.



Abdelmadjid M. Lahlaf, Ph.D., P.E.
Principal Engineer

LGCI
Lahlaf Geotechnical Consulting, Inc.

GEOTECHNICAL REPORT
PROPOSED IMPORVEMENTS –
THORNDYKE ROAD ELEMENTARY SCHOOL
WORCESTER, MASSACHUSETTS

LGCI Project No. 2424
September 6, 2024

Prepared for:

Mount Vernon Group Architects, Inc.
178 Albion St., Suite 240
Wakefield, MA 01880
Phone: (781) 213-5030

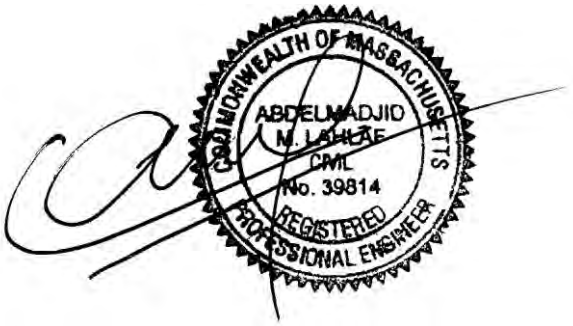
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September 6, 2024

Prepared for:

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Principal Engineer

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1. PROJECT INFORMATION

1.1 Project Authorization

This geotechnical report presents the results of the subsurface explorations and a geotechnical evaluation performed by Lahlaf Geotechnical Consulting, Inc. (LGCI) for the proposed improvements at the Thorndyke Road Elementary School in Worcester, Massachusetts. We performed our services in general accordance with our proposal No. 24065 dated June 28, 2024. Mr. William Peters of Mount Vernon Group Architects, Inc. (MVG) authorized our services by signing our proposal on July 11, 2024.

1.2 Purpose and Scope of Services

The purpose of our geotechnical services was to perform subsurface explorations at the site for the proposed improvements at the Thorndyke Road Elementary School, and to provide foundation design and construction recommendations. LGCI performed the following services:

- Coordinated our exploration locations with MVG.
- Marked the exploration locations at the site and notified Dig Safe Systems Inc. (Dig Safe) and the City of Worcester for utility clearance.
- Engaged a drilling subcontractor for one (1) day to advance three (3) soil borings at the site. Our drilling subcontractor installed one (1) groundwater observation well in one (1) of the soil borings.
- Provided an LGCI geotechnical field representative at the site to coordinate and observe the borings, describe the soil samples, and prepare field logs.
- Submitted two (2) soil samples collected from the borings for laboratory testing.
- Prepared this geotechnical report containing the results of our subsurface explorations and our recommendations for foundation design and construction.

Our scope includes preparing specifications, reviewing contract documents, attending meetings, and providing construction services. These services will be performed separately and are not included in this geotechnical report. Recommendations for stormwater management, erosion control, pavement design, site specific seismic and liquefaction analyses, pile analysis and design, FEMA 100-year flood elevation, historic uses of site, contaminated soil and groundwater treatment and disposal requirements and techniques, and cost or quantity estimates are not included in our scope of work.

LGCI's scope of services does not include an environmental assessment for the presence or absence of wetlands or analytical testing for hazardous or toxic materials in the soil, surface



water, groundwater, or air, on or below or around this site, or mold in the soil or in any structure at the site. Any statements regarding odors, colors, or unusual or suspicious items or conditions are strictly for the information of the client.

1.3 Site Description

Our understanding of the site is based on our field observations, our discussions with MVG, and the following drawings:

- Drawing titled: “Plot Plan, Thorndyke Rd. School, Worcester Public Schools” (Plot Plan) provided to LGCI by MVG via email on June 17, 2024.

- Drawing titled: "Existing Conditions Plan, 30 Thorndyke Road, Worcester, Massachusetts (Worcester County)," (Existing Conditions Plan) prepared by Brennan Consulting, dated August 21, 2024, and provided to LGCI by Mount Vernon Group Architects, Inc., via e-mail on August 22, 2024

The site of the existing Thorndyke Road Elementary School is located at 30 Thorndyke Road in Worcester, MA as shown in Figure 1. The site is bordered by Thorndyke Road on the northern side, and by woods and private properties on the other three sides. The site is currently occupied by the existing main school building, an L-shaped modular building, paved parking lots and driveways, playgrounds, and athletic fields.

Based on the Existing Conditions Plan, the existing grades at the site range between El. 715 feet near the eastern edge of the site and El. 721 feet near the western edge of the site. The existing grade near the footprint of the proposed elevator is at approximately El. 716 feet.

1.4 Project Description

Our understanding of the proposed construction is based on our discussions with MVG, and the drawings listed in Section 1.3.

We understand that the City of Worcester has engaged MVG to design improvements at the site. Based on the Plot Plan, we understand that the improvements will include a handicap ramp on the northern side of the modular building and an interior elevator near the southcentral portion of the main building, just north of the modular building. Information about the layout, the size, and location of the improvements was not available to LGCI.

1.5 Elevation Datum

We understand that the elevations provided in the Existing Conditions Plan are in reference to the North American Vertical Datum of 1988 (NAVD88).



2. SITE AND SUBSURFACE CONDITIONS

2.1 Surficial Geology

LGCI reviewed a surficial geologic map titled: "Surficial Materials Map of the Worcester North Quadrangle, Massachusetts," prepared by Stone, B.D., and Stone, J.R., Scientific Investigation Map 3402, Quadrangle 80 – Worcester North, 2018.

The surficial geologic map of the site indicates that the natural soils in the general vicinity of the site consist of thick till.

The thick till consists of nonsorted, nonstratified matrix of sand, some silt, little clay containing scattered pebble, cobble, and boulder clasts. Thick till is generally greater than 10 to 15 feet thick.

The Surficial Geologic Map is shown in Figure 2.

2.2 LGCI's Explorations

2.2.1 General

LGCI coordinated our exploration locations with MVG and notified Dig Safe and the City of Worcester for utility clearance prior to starting our explorations at the site.

Unless notified otherwise, we will dispose of the soil samples obtained during our explorations after three (3) months.

2.2.2 LGCI's Soil Borings

LGCI engaged Soil Exploration, Corp. (Soil X) of Leominster, Massachusetts to advance three (3) soil borings (B-1, B-2, and B-3-OW) at the site on July 24, 2024. The borings were advanced with a Mobile B-57 ATV drill rig using 4-¼-inch inner-diameter hollow stem augers. The borings extended to depths ranging between 9.0 and 22.0 feet beneath the ground surface. Upon completion, the boreholes were backfilled with the drill cuttings, sand, and bentonite (as noted in the boring logs). The pavement was restored with either concrete or cold patch asphalt (as noted in the boring logs). Soil X installed one (1) groundwater observation well in boring B-3-OW.

Soil X performed Standard Penetration Tests (SPT) and obtained split spoon samples with an automatic hammer at typical depth intervals of 2 feet or 5 feet as noted on the boring logs in general accordance with ASTM D-1586.

An LGCI geotechnical field representative observed and logged the borings in the field.



2.2.3 Exploration Logs and Locations

The boring locations are shown in Figure 3. Appendix A contains LGCI's boring logs and Table 1 includes a summary of LGCI's borings.

2.3 Subsurface Conditions

The subsurface description in this report is based on a limited number of borings and is intended to highlight the major soil strata encountered during our explorations. The subsurface conditions are known only at the actual boring locations. Variations may occur and should be expected between boring locations. The boring logs represent conditions that we observed at the time of our explorations and were edited, as appropriate, based on the results of the laboratory test data and inspection of the soil samples in the laboratory. The strata boundaries shown in our boring logs are based on our interpretations and the actual transitions may be gradual. Graphic soil symbols are for illustration only.

The soil strata encountered in LGCI's borings were as follows, starting at the ground surface.

Topsoil – A layer of surficial organic topsoil was encountered at the ground surface in boring B-1. The thickness of the topsoil was approximately 0.1 feet.

Concrete – A layer of surficial concrete was encountered at the ground surface in boring B-2. The thickness of the concrete was approximately 0.7 feet.

Asphalt – A layer of surficial asphalt was encountered at the ground surface in boring B-3-OW. The thickness of the asphalt was approximately 0.6 feet.

Fill – A layer of fill was encountered beneath the topsoil, concrete, or asphalt in all borings. The fill extended to depths ranging between 1.3 to 2.0 feet beneath the ground surface. Two (2) samples were described as well graded sand, and one (1) sample was described as silty sand. The fines content in the fill ranged between 5 and 50 percent, and the gravel content ranged between 5 and 20 percent. The samples in the fill contained traces of roots and asphalt.

The SPT N-value in this layer was 23 bpf, indicating medium dense material. Please note that the high SPT N-value recorded in the fill may be due to obstructions such as cobbles and boulders present in the fill and may not represent the true density of the fill.

Sand and Gravel – A layer of sand and gravel was encountered beneath the layer of fill and extended to the termination depths in all borings. The samples in this layer were mostly described as silty sand. One (1) sample was described as sandy silt. The fines content in this layer ranged between 15 and 35 percent, and the gravel content ranged between 0 and 30 percent. When described as silt, the sand content ranged between 35 and 40 percent. One (1) sample contained traces of weathered rock.



The SPT N-values in this layer ranged between 5 bpf and 36 bpf, with most values ranging between 16 and 30 bpf, indicating mostly medium dense to dense material. Please note that the high SPT N-values in the sand and gravel may be due to obstructions such as cobbles and boulders in the sand and gravel and may not represent the true density of the sand and gravel.

2.4 Groundwater

Groundwater was encountered in boring B-3-OW at a depth of 20.0 feet beneath the ground surface, as shown in Table 1 and in the boring logs. Groundwater was not observed in borings B-1 and B-2.

The groundwater information reported herein is based on observations made during or shortly after the completion of drilling. Therefore, the reported groundwater levels may not represent the actual groundwater conditions, as additional time may be required for the groundwater levels to stabilize. The groundwater information presented in this report only represents the conditions encountered at the time and location of the explorations. Seasonal fluctuation should be anticipated.

2.5 Laboratory Test Data

LGCI submitted two (2) soil samples collected from the borings for grain-size analysis. The results of the grain-size analyses are provided in the test data sheets included in Appendix B and are summarized in the table below:

Grain-Size Analysis Test Results

Boring No.	Sample No.	Stratum	Sample Depth (ft.)	Percent Gravel	Percent Sand	Percent Fines
B-1	S1 Bot. 9”	Fill	0.0 – 2.0	10.3	40.6	49.1
B-3-OW	S2	Sand & Gravel	3.0 – 5.0	9.6	37.2	53.2



3. EVALUATION AND RECOMMENDATIONS

3.1 General

Based on our understanding of the proposed construction, our observation of our borings, and the results of our laboratory testing, there are a few issues that we would like to highlight for consideration and discussion.

3.1.1 Surficial Topsoil, Asphalt, Concrete, and Existing Fill

- The topsoil, asphalt, and concrete should be removed from within the entire construction area, including the proposed elevator footprint and the paved areas.

- The existing fill was observed to be variable in composition and density. In addition, the existing fill contained traces of organic soil. Existing fill that was not placed with strict moisture, density, and gradation control presents risk of unpredictable settlement that may result in poor performance of floor slabs and foundations. Due to these risks, the existing fill should be entirely removed from within the proposed elevator pit. The elevator pit should be supported on Structural Fill placed directly on top of the natural sand and gravel. The removal should extend at least 2 feet beyond the limits of the proposed elevator pit, or other structure, if any.

- The subgrade of footings should be prepared in accordance with the recommendations in Section 4.1.

- Within paved areas, the existing fill and subsoil should be removed to the top of the natural sand and gravel or to a depth of 18 inches beneath the bottom of the proposed pavement, whichever occurs first. Where organic soil is exposed, the organic soil should be removed. The existing fill and subsoil deeper than 18 inches beneath the bottom of the proposed pavement can remain in place provided these materials are firm and unyielding following proofrolling as described in Section 4.1.

3.1.2 Shallow Footings and Slabs-on-Grade

If the proposed elevator is provided within a proposed building enclosure, the enclosure should be supported on shallow foundations bearing in Structural Fill placed directly on top of the natural sand and gravel. The slab of the proposed enclosure should be designed as a slab-on-grade. Our recommendation for net allowable bearing capacity in the sand and gravel is presented in Section 3.2.1. Our recommendations for slabs-on-grade are presented in Section 3.3.1. Our recommendations for lateral pressures for the proposed elevator pit walls and other retaining walls are presented in Section 3.5. Section 4.1 provides recommendations for preparation of subgrades.



3.2 Foundation Recommendations

3.2.1 Footing Design

- We recommend entirely removing the surficial topsoil, asphalt, concrete, and the existing fill from within the proposed building footprint as described in Section 3.1.1.

- We recommend supporting the elevator enclosure on spread footings bearing on Structural Fill placed directly on the natural sand and gravel.

- We recommend designing the proposed footings using a net allowable bearing pressure of 4 kips per square foot (ksf). We recommend that the footings bear on a minimum of 12 inches of Structural Fill placed directly on top of the natural sand and gravel or on weathered rock. The Structural Fill should extend at least 1 foot laterally beyond the limits of the footings.

- Footing subgrades should be prepared in accordance with the recommendations in Section 4.1.

- Foundations should be designed in accordance with The Commonwealth of Massachusetts State Building Code 780 CMR, Ninth Edition (MSBC 9th Edition).

- Exterior footings and footings in unheated areas should be placed at a minimum depth of 4 feet below the final exterior grade to provide adequate frost protection. Interior footings in heated areas may be designed and constructed at a minimum depth of 2 feet below finished floor grades.

- Wall footings should be designed and constructed with continuous, longitudinal steel reinforcement for greater bending strength to span across small areas of loose or soft soils that may go undetected during construction.

- A representative of LGCI should be engaged to observe that the subgrade has been prepared in accordance with our recommendations.

3.2.2 Settlement Estimates

Based on our experience with similar soils and designs using a net allowable bearing pressure of 4 ksf, we anticipate that the total settlement will be approximately 1 inch, and that the differential settlement of the footings will be 3/4 inch or less over a distance of 25 feet. We believe that total and differential settlements of this magnitude are tolerable for a similar structure. However, the tolerance of the proposed structure to the predicted total and differential settlements should be assessed by the structural engineer.



3.3 Concrete Slab Considerations

3.3.1 Slabs-on-Grade

- Floor slabs should be constructed as a slabs-on-grade bearing on a minimum of 12 inches of Structural Fill placed directly on top of the sand and gravel. The subgrade of the slabs should be prepared as described in Section 4.1.

- To reduce the potential for dampness in the proposed floor slab, the project architect may consider placing a vapor barrier beneath the floor slab. The vapor barrier should be protected from puncture during the placement of the proposed slab reinforcement.

- For the design of the floor slab bearing on the materials described above, we recommend using a modulus of subgrade reaction, k_{s1}, of 100 tons per cubic foot (tcf). Please note that the values of k_{s1} are for a 1 x 1 square foot area. These values should be adjusted for larger areas using the following expression:

$$Modulus\ of\ Subgrade\ \mathrm{Re}action\ (k_s) = k_{s1} * \left(\frac{B+1}{2B}\right)^2$$

where:

k_s = Coefficient of vertical subgrade reaction for loaded area;
k_{s1} = Coefficient of vertical subgrade reaction for a 1 x 1 square foot area; and
B = Width of area loaded, in feet.

Please note that cracking of slabs-on-grade can occur as a result of heaving or compression of the underlying soil, but also as a result of concrete curing stresses. To reduce the potential for cracking, the precautions listed below should be closely followed during the construction of all slabs-on-grade:

- Construction joints should be provided between the floor slab and the walls and columns in accordance with the American Concrete Institute (ACI) requirements, or other applicable code.

- The backfill in interior utility trenches should be properly compacted.

- In order for the movement of exterior slabs not to be transmitted to foundations or superstructures, exterior slabs, such as approach slabs and sidewalks, should be isolated from the superstructure.



3.3.2 Under-slab Drains and Waterproofing

The finished floor elevation (FFE) of the proposed ground floor was not provided to us. However, assuming that the proposed FFE matches the existing grades, an under-slab drainage system would not be required beneath the proposed floor slab. The elevator pit should be designed to be waterproof to protect against surface water and runoff that may infiltrate through the soil.

3.4 Seismic Design

Based on the SPT N-values from the borings, we estimate that the seismic criteria for the site are as follows:

- Site Class: D
- Spectral Response Acceleration at short period (Ss): 0.180g
- Spectral Response Acceleration at 1 sec. (S_1): 0.066g
- Site Coefficient Fa (Table 1613.5.3(1)): 1.6
- Site Coefficient Fv (Table 1613.5.3(2): 2.4
- Adjusted spectral response S_{MS}: 0.288g
- Adjusted spectral response S_{M1}: 0.158g

Based on the SPT data from the borings, the site soils are not susceptible to liquefaction.

3.5 Lateral Pressures for Wall Design

3.5.1 Lateral Earth Pressures

Lateral earth pressures for the design of below-grade walls, and site retaining walls, if any, are provided below.

Coefficient of Active Earth Pressure, K_A:	0.31
Coefficient of At-Rest Earth Pressure, K_o:	0.47
Coefficient of Passive Earth Pressure, K_p:	3.25
Total Unit Weight γ:	125 pcf

Note: The values in the table are based on a friction angle for the backfill of 32 degrees and neglecting friction between the backfill and the wall. The design active and passive coefficients are based on horizontal surfaces (non-sloping backfill) on both the active and passive sides, and on a vertical wall face.

- Exterior walls of below-ground spaces and other retaining walls braced at the top to restrain movement/rotation, should be designed using the "at-rest" pressure coefficient.

- We recommend placing free-draining material within the 3 feet immediately behind retaining walls.



- We recommend providing weep holes at the bottom of site retaining walls, including temporary SOE systems, to promote drainage where possible. Alternatively, a pipe should be placed at the base of the wall to collect the water. Groundwater collected by the wall drains should be discharged into a lower area if gravity flow is possible.

- Passive earth pressures should only be used at the toe of the wall where special measures or provisions are taken to prevent the disturbance or future removal of the soil on the passive side of the wall, or in areas where the wall design includes a key. In any case, the passive pressures should be neglected in the top 4 feet.

- Where a permanent vertical uniform load will be applied to the active side immediately adjacent to the wall, a horizontal surcharge load equal to half of the uniform vertical load should be applied over the height of the wall. At a minimum, a temporary lateral construction surcharge load of 100 pounds per square foot (psf) should be applied uniformly over the height of the wall.

- We recommend using an ultimate friction factor of 0.5 between the sand and gravel and the bottom of the wall. Below-grade walls should be designed for minimum factors of safety of 1.5 for sliding and 2.0 for overturning.

3.5.2 Seismic Pressures

In accordance with the Massachusetts State Building Code, 9th Edition (MSBC 9th Edition), Section 1610, a lateral earthquake force equal to $0.100*(S_s)*(F_a)*\gamma*H^2$ should be included in the design of the walls (for horizontal backfill), where S_s is the maximum considered earthquake spectral response acceleration (defined in Section 3.4), F_a is the site coefficient (defined in Section 3.4), γ is the total unit weight of the soil backfill, and H is the height of the wall.

The earthquake force should be distributed as an inverted triangle over the height of the wall. In accordance with MSBC 9th Edition, Section 1610.2, a load factor of 1.43 should be applied to the earthquake force for wall strength design.

Temporary surcharges should not be included when designing for earthquake loads. Surcharge loads applied for extended periods of time should be included in the total static lateral soil pressure, and their earthquake lateral force should be computed and added to the force determined above.

3.6 Parking Lots, Driveways, Sidewalks, and Ramps

3.6.1 General

The subsurface conditions encountered at the site are generally suitable to support the proposed driveways, parking lots, sidewalks, and ramps after preparation of the subgrade as described in Section 4.1.



- We recommend entirely removing the topsoil from within the footprint of the proposed driveways and parking lots.

- The existing fill and subsoil should be improved in accordance with the recommendations in Section 4.1.

- Cobbles and boulders should be removed to at least 18 inches below the bottom of the pavement.

3.6.2 Sidewalks and Ramps

- Sidewalks and ramps should be placed on a minimum of 12 inches of Structural Fill with less than 5 percent fines.

- To reduce the potential for heave caused by surface water penetrating under the sidewalk, the joints between sidewalk concrete sections should be sealed with a waterproof compound. The sidewalks should be sloped away from the building or other vertical surfaces to promote flow of water. To the extent possible, roof leaders should not discharge onto sidewalk surfaces.

3.6.3 Pavement Sections

A typical, minimum, standard-duty pavement section that could be used for parking areas is as follows:

1.5" Asphalt "Top Course"
2.0" Asphalt "Base Course"
8" Processed Gravel for Sub-Base (MassDOT M1.03.1)

A typical, minimum, heavy-duty pavement section that could be used for areas of heavy truck traffic is as follows:

2.0" Asphalt "Top Course"
2.5" Asphalt "Base Course"
12" Processed Gravel for Sub-Base (MassDOT M1.03.1)

The pavement sections shown above represent minimum thicknesses representative of typical local construction practices for similar use. Periodic maintenance should be anticipated.

Pavement material types and construction procedures should conform to specifications of the “Standard Specifications for Highways and Bridges,” prepared by the Commonwealth of Massachusetts Department of Transportation dated 2023.



Areas to receive relatively highly concentrated, sustained loads such as dumpsters, loading areas, and storage bins are typically installed over a rigid pavement section to distribute concentrated loads and reduce the possibility of high stress concentrations on the subgrade. Typical rigid pavement sections consist of 6 inches of concrete placed over a minimum of 12 inches of subbase material.



4. CONSTRUCTION CONSIDERATIONS

4.1 Subgrade Preparation

- Asphalt, topsoil, concrete, organic materials, existing fill, buried organic soil, buried subsoil, abandoned utilities, buried foundations, and other below-ground structures should be entirely removed from within the footprint of the proposed elevator pit and site structures, if any.

- Tree stumps, root balls, and roots larger than ½ inch in diameter should be removed and the cavities filled with suitable material and compacted per Section 4.3 of this report.

- Cobbles and boulders should be removed at least 6 inches from beneath footings and 18 inches beneath the bottom of slabs and paved areas. The resulting excavations should be backfilled with compacted Structural Fill under the building and with Ordinary Fill under the subbase of paved areas.

- The bottom of the excavation resulting from the removal of the existing fill and subsoil, or natural soil should be compacted with a dynamic vibratory compactor imparting a minimum of 10 kips of force to the subgrade.

- The base of the footing excavations in granular soil should be compacted with a dynamic vibratory compactor weighing at least 200 pounds and imparting a minimum of 4 kips of force to the subgrade.

- After the surficial materials are removed to a depth of 18 inches within the proposed paved areas, walkways, and ramps in accordance with the recommendations in Section 3.1, the exposed existing fill deeper than 18 inches beneath the bottom of the proposed pavement or ramp concrete should be improved by compacting the exposed surface with at least six (6) passes of a vibratory roller compactor imparting a dynamic effort of at least 10 kips. Where soft zones of soil are observed, the soft soil should be removed, and the grade should be restored using Ordinary Fill to the bottom of the proposed subbase layer. If pumping of the existing fill deeper than 18 inches beneath the bottom of the proposed pavement is observed, the soft and/or pumping material should be removed and replaced.

- Fill placed within the footprint of the proposed buildings should meet the gradation and compaction requirements of Structural Fill, shown in Section 4.3.1.

- Fill placed under the subbase of paved areas should meet the gradation and compaction requirements of Ordinary Fill, shown in Section 4.3.2.

- Fill placed in the top 12 inches beneath sidewalks should consist of Structural Fill with less than 5 percent fines.



- Loose or soft soils identified during the compaction of the footing or floor slab subgrades should be excavated to a suitable bearing stratum, as determined by the representative of LGCI. Grades should be restored by backfilling with Structural Fill or crushed stone.

- When crushed stone is required in the drawings or is used for the convenience of the contractor, it should be wrapped in a geotextile fabric for separation except where introduction of the geotextile fabric promotes sliding. A geotextile fabric should not be placed between the bottoms of the footings and the crushed stone.

- An LGCI representative should observe the exposed subgrades prior to fill and concrete placement to verify that the exposed bearing materials are suitable for the design soil bearing pressure. If soft or loose pockets are encountered in the footing excavations, the soft or loose materials should be removed and the bottom of the footing should be placed at a lower elevation on firm soil, or the resulting excavation should be backfilled with Structural Fill, or crushed stone wrapped in a filter fabric.

4.2 Subgrade Protection

The onsite fill and natural soils are frost susceptible. If construction takes place during freezing weather, special measures should be taken to prevent the subgrade from freezing. Such measures should include the use of heat blankets or excavating the final 6 inches of soil just before pouring the concrete. Footings should be backfilled as soon as possible after footing construction. Soil used as backfill should be free of frozen material, as should the ground on which it is placed. Filling operations should be halted during freezing weather.

Materials with high fines contents are typically difficult to handle when wet, as they are sensitive to moisture content variations. Subgrade support capacities may deteriorate when such soils become wet and/or disturbed. The contractor should keep exposed subgrades properly drained and free of ponded water. Subgrades should be protected from machine and foot traffic to reduce disturbance.

4.3 Fill Materials

Structural Fill and Ordinary Fill should consist of inert, hard, durable sand and gravel free from organic matter, clay, surface coatings, and deleterious materials, and should conform to the gradation requirements shown below.

4.3.1 Structural Fill

The Structural Fill should have a plasticity index of less than 6 and should meet the gradation requirements shown below. Structural Fill should be compacted in maximum 9-inch loose lifts to at least 95 percent of the Modified Proctor maximum dry density (ASTM D1557), with moisture contents within ±2 percentage points of the optimum moisture content.



Sieve Size Percent	Passing by Weight
3 inches	100
1 ½ inch	80-100
½ inch	50-100
No. 4	30-85
No. 20	15-60
No. 60	5-35
No. 200*	0-10

* 0 – 5 for the top 12 inches under sidewalks, exterior slabs, pads, ramps, and walkways

4.3.2 Ordinary Fill

Ordinary Fill should have a plasticity index of less than 6 and should meet the gradation requirements shown below. Ordinary Fill should be compacted in maximum 9-inch loose lifts to at least 95 percent of the Modified Proctor maximum dry density (ASTM D1557), with moisture contents within ±2 percentage points of the optimum moisture content.

Sieve Size Percent	Passing by Weight
6 inches	100
1 inch	50-100
No. 4	20-100
No. 20	10-70
No. 60	5-45
No. 200	0-20

4.4 Reuse of Onsite Materials

Based on our field observations and the results of the grain-size analyses, the onsite fill is too silty and does not meet the gradation requirements for Ordinary Fill or Structural Fill. The existing fill can be used in landscaped areas.

The contractor should avoid mixing the reusable soils with fine-grained and/or organic soils. The soils to be reused should be excavated and stockpiled separately for compliance testing. Soils with 20 percent or greater fines contents are generally very sensitive to moisture content variations and are susceptible to frost. Such soils are very difficult to compact at moisture contents that are much higher or much lower than the optimum moisture content determined from the laboratory compaction test. Therefore, strict moisture control should be implemented during the compaction of onsite soils with fines contents of 20 percent or greater. The contractor should be prepared to remove and replace such soils if pumping occurs.

Suitable imported material and amended/improved onsite materials should be stockpiled separately from unimproved onsite soils.



Materials to be used as fill should first be tested for compliance with the applicable gradation specifications.

4.5 Groundwater Control Procedures

Based on the groundwater levels measured in our borings and groundwater observation well, we do not anticipate that major groundwater control procedures will be needed during construction. We anticipate that filtered deep sump pumps and sump pumps installed in a series of pits located at least 3 feet below the bottom of planned excavations may be sufficient to handle groundwater and surface runoff that may enter the excavation during wet weather. The contractor should be prepared to use multiple sump pumps to maintain dry excavations during the removal of the existing fill.

The contractor should be permitted to employ whatever commonly accepted means and practices are necessary to maintain the groundwater level below the bottom of the excavation and to maintain a dry excavation during wet weather. Groundwater levels should be maintained at a minimum of 1 foot below the bottom of the excavations during construction. The placement of reinforcing steel or concrete in standing water should not be permitted.

To reduce the potential for sinkholes developing over sump pump pits after the sump pumps are removed, the crushed stone placed in the sump pump pits should be wrapped in a geotextile fabric. Alternatively, the crushed stone should be entirely removed after the sump pump is no longer in use, and the sump pump pit should be restored with suitable backfill.

4.6 Temporary Excavations

All excavations to receive human traffic should be constructed in accordance with OSHA guidelines.

The site soils should generally be considered Type “C” and should have a maximum allowable slope of 1.5 Horizontal to 1 Vertical (1.5H:1V) for excavations less than 20 feet deep. Deeper excavations, if needed, should have shoring designed by a professional engineer.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain the stability of the excavation sides and bottom.



5. REPORT LIMITATIONS

Our analyses and recommendations are based on project information provided to us at the time of this report. If changes to the type, size, and location of the proposed structures or to the site grading are made, the recommendations contained in this report shall not be considered valid unless the changes are reviewed, and the conclusions and recommendations modified in writing by LGCI. LGCI cannot accept responsibility for designs based on our recommendations unless we are engaged to review the final plans and specifications to determine whether any changes in the project affect the validity of our recommendations, and whether our recommendations have been properly implemented in the design.

It is not part of our scope to perform a more detailed site history; therefore, we have not explored for or researched the locations of buried utilities or other structures in the area of the proposed construction. Our scope did not include environmental services or services related to moisture, mold, or other biological contaminants in or around the site.

The recommendations in this report are based in part on the data obtained from the subsurface explorations. The nature and extent of variations between explorations may not become evident until construction. If variations from anticipated conditions are encountered, it may be necessary to revise the recommendations in this report. We cannot accept responsibility for designs based on recommendations in this report unless we are engaged to 1) make site visits during construction to check that the subsurface conditions exposed during construction are in general conformance with our design assumptions and 2) ascertain that, in general, the work is being performed in compliance with the contract documents.

Our report has been prepared in accordance with generally accepted engineering practices and in accordance with the terms and conditions set forth in our agreement. No other warranty, expressed or implied, is made. This report has been prepared for the exclusive use of Mount Vernon Group Architects, Inc. for the Proposed Improvements for Thorndyke Road Elementary School in Worcester, Massachusetts as conceived at this time.



6. REFERENCES

In addition to the references included in the text of the report, we used the following references:

American Society of Civil Engineers, "Minimum Design Loads and Associated Criteria for Buildings and Other Structures," ASCE/SEI 7-16, 2017.

The Commonwealth of Massachusetts (2017), "The Massachusetts State Building Code, Ninth (9^{th}) Edition."

The Department of Labor, Occupational Safety and Health Administration (1989), "Occupational Safety and Health Standards - Excavations; Final Rule," 20 CFR Part 1926, Subpart P.

USGS Worcester, MA topographic map from http://mapserver.mytopo.com.



Table 1 - Summary of LGCI's Borings
Proposed Improvements -
Thorndyke Road Elementary School
Worcester, MA
LGCI Project No. 2424

Boring No.	Ground Surface Elevation (ft.)[1]	Groundwater[2] Depth / **El.** (ft.)	Bottom of Topsoil / **Asphalt /** *Concrete* Depth / **El.** (ft.)	Bottom of Fill Depth / **El.** (ft.)	Bottom of Sand and Gravel Depth / **El.** (ft.)	Bottom of Boring Depth / **El.** (ft.)
B-1	719.0	- / **-**	0.1 / **718.9**	2.0 / **717.0**	9.0 [3]/ **710.0**	9.0 / **710.0**
B-2	719.0	- / **-**	*0.7* / **718.3**	1.6 / **717.4**	17.0 [3]/ **702.0**	17.0 / **702.0**
B-3-OW	716.0	20.0 / **696.0**	**0.6** / **715.4**	1.3 / **714.7**	22.0 [3]/ **694.0**	22.0 / **694.0**

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: ""Existing Conditions Plan, 30 Thorndyke Road, Worcester, Massachusetts (Worcester County)," prepared by Brennan Consulting, dated August 21, 2024, and provided to LGCI via e-mail on August 22, 2024.
2. Groundwater was measured during drilling, at the end of drilling, after drilling, or based on sample moisture whichever is shallower.
3. Boring terminated in the sand and gravel layer.
4. "-" means groundwater was not encountered.



Contour Intervals: 3 meters

0.4 mi

Note: Figure based on USA Topo Maps of Worcester, MA *ngmdb.usgs.gov/topoview/viewer*

Client:	Project:		
Mount Vernon Group Architects, Inc.	Proposed Improvements - Thorndyke Road Elementary School	Figure 1 – Site Location Map	
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Worcester, MA	LGCI Project No.: 2424	Date: Sept. 2024



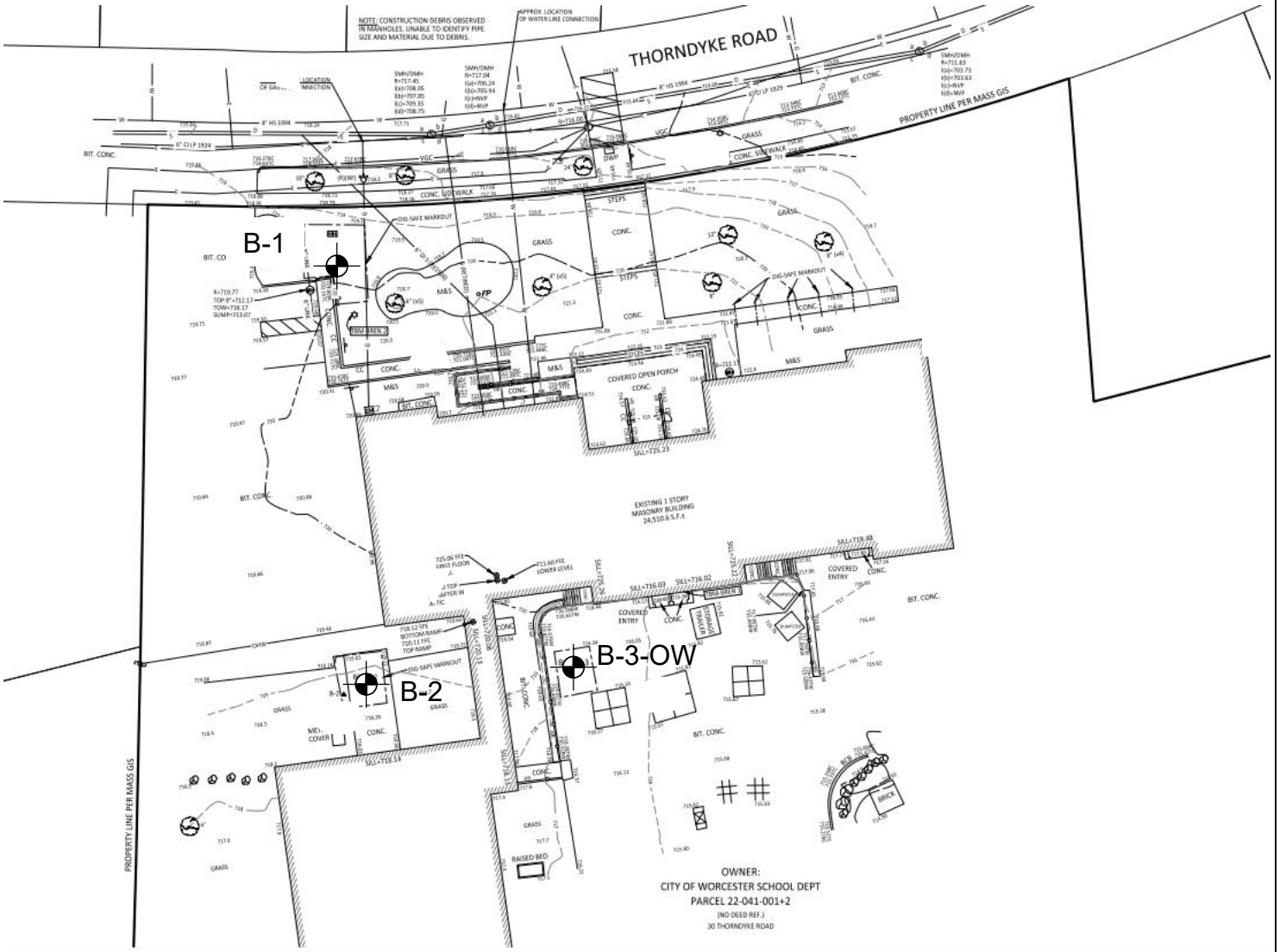
Thick till—Nonsorted, nonstratified matrix of sand, some silt, and little clay containing scattered pebbles, cobbles, and boulders in the shallow subsurface; at greater depths consists of compact, nonsorted matrix of silt, very fine sand, and some clay containing scattered small gravel clasts. Mapped in areas where till is greater than 10 to 15 ft thick, mostly in drumlin landforms in which till thickness commonly exceeds 100 ft (maximum recorded thickness is 230 ft). Although upper till of late Wisconsinan age is the surface deposit, lower till of probable Illinoian age constitutes the bulk of the material in thick-till areas. Lower till is moderately to very compact and is commonly finer grained and less stony than upper till. An oxidized zone, the lower part of a soil profile formed during a period of interglacial weathering, is generally present in the upper part of the lower till. This zone commonly shows closely spaced joints that are stained with iron and manganese oxides

Note: Figure based on map titled: "Surficial Materials Map of the Worcester North Quadrangle, Massachusetts," prepared by Byron D. Stone, Janet R. Stone, and Mary DiGiacomo-Cohen, Scientific Investigation Map 3402, Quadrangle 80 – Worcester North, 2018.

Client:	Project:	Figure 2 – Surficial Geologic Map	
Mount Vernon Group Architects, Inc.	Proposed Improvements - Thorndyke Road Elementary School		
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Worcester, MA	LGCI Project No.: 2424	Date: Sept. 2024

Legend

Approximate location of borings advanced by Soil X, Corp. of Leominster, MA on July 24, 2024, and observed by Lahlaf Geotechnical Consulting, Inc. (LGCI).



MASSACHUSETTS COORDINATE SYSTEM NAD 83, MAINLAND ZONE

Approximate Scale (ft.)

20 0 10 20 40 80

Note

Figure based on drawing titled: "Existing Conditions Plan, 30 Thorndyke Road, Worcester, Massachusetts (Worcester County)," prepared by Brennan Consulting, dated August 21, 2024, and provided to LGCI by Mount Vernon Group Architects, Inc., via e-mail on August 22, 2024.

Client: Mount Vernon Group Architects, Inc.	Project: Proposed Improvements – Thorndyke Road Elementary School	Figure 3 – Boring Location Plan	
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Worcester, MA	LGCI Project No.: 2424	Date: Sept. 2024

LGCI
Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Rd Suite 2
Billerica, MA 01862
Telephone: 9783305912
Fax: 9783305056

BORING LOG

B-1
PAGE 1 OF 1

CLIENT: Mount Vernon Group Architects, Inc.
PROJECT NAME: Proposed Improvements - Thorndyke Road Elem. School
LGCI PROJECT NUMBER: 2424
PROJECT LOCATION: Worcester, MA

DATE STARTED: 7/24/24 **DATE COMPLETED:** 7/24/24
BORING LOCATION: Near NW corner of existing school
COORDINATES: NA
SURFACE El.: 719 ft. NAVD 88 (see note 1) **TOTAL DEPTH:** 9 ft.
WEATHER: 70's / Raining
GROUNDWATER LEVELS:
DURING DRILLING: Not Encountered
AT END OF DRILLING: Dry at the end of drilling
OTHER: -

DRILLING SUBCONTRACTOR: Soil X, Corp.
DRILLING FOREMAN: Mike Houd
DRILLING METHOD: Hollow Stem Auger (4-1/4" I.D.)
DRILL RIG TYPE/MODEL: Mobile B-57 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: BH **CHECKED BY:** EP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	S1	3-11-12-10 (23)	24/10		Topsoil / Fill	718.9	S1 - Top 1": Topsoil Bot. 9": Silty SAND (SM), fine to coarse, 45-50% fines, 10-15% fine subangular gravel, trace of roots, brown, moist
		2	S2	8-7-9-10 (16)	24/2			2.0 717.0	S2 - Silty SAND (SM), fine to medium, 15-20% fines, 5-10% fine subangular gravel, brown, moist
	715.0	4	S3	11-12-15-14 (27)	24/4		Sand and Gravel		S3 - Similar to S2
5		6	S4	14-13-15-41 (28)	24/20				S4 - Silty SAND with Gravel (SM), fine to medium, 20-25% fines, 15-20% fine to coarse subangular gravel, brown, moist
		8				1			REMARK 1: Auger chattering observed on possible boulder at a depth of 8 feet.
	710.0					2		9.0	REMARK 2: Auger shifted east due to contact with possible boulder at a depth of 9 feet. Borehole terminated due to proximity to existing utilities after auger shifted. Bottom of borehole at 9.0 feet. Borehole backfilled with the drill cuttings.
10									
	705.0								
15									
	700.0								
20									
	695.0								
25									

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing titled: "Existing Conditions Plan, 30 Thorndyke Road, Worcester, Massachusetts (Worcester County)," prepared by Brennan Consulting, dated August 21, 2024, and provided to LGCI by Mount Vernon Group Architects, Inc., via e-mail on August 22, 2024.

Appendix A – LGCI's Boring Logs

LGCI
Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Rd Suite 2
Billerica, MA 01862
Telephone: 9783305912
Fax: 9783305056

BORING LOG

B-2
PAGE 1 OF 1

CLIENT: Mount Vernon Group Architects, Inc.
PROJECT NAME: Proposed Improvements - Thorndyke Road Elem. School
LGCI PROJECT NUMBER: 2424
PROJECT LOCATION: Worcester, MA

DATE STARTED: 7/24/24 **DATE COMPLETED:** 7/24/24
BORING LOCATION: Center of walkway to existing modular building
COORDINATES: NA
SURFACE El.: 719 ft. NAVD 88 (see note 1) **TOTAL DEPTH:** 17 ft.
WEATHER: 70's / Raining
GROUNDWATER LEVELS:
DURING DRILLING: Not Encountered
AT END OF DRILLING: Not Encountered
OTHER: -

DRILLING SUBCONTRACTOR: Soil X, Corp.
DRILLING FOREMAN: Mike Houd
DRILLING METHOD: Hollow Stem Auger (4-1/4" I.D.)
DRILL RIG TYPE/MODEL: Mobile B-57 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: BH **CHECKED BY:** EP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
							Concrete	0.7 / 718.3	Concrete
							Fill	1.6 / 717.4	S1 - Top 7": Well Graded SAND with Silt (SW-SM), fine to coarse, 10-15% fines, 5-10% fine subangular gravel, dark brown, moist
		1	S1	3-3-2-2 (5)	24/11				Bot. 4": Silty SAND (SM), fine to medium, trace coarse, ~20% fines, 0-5% fine subangular gravel, brown to olive gray, moist
		3							
	715.0		S2	5-13-13-14 (26)	24/2				S2 - Similar to S1 Bot. 4"
5		5	S3	11-11-10-10 (21)	24/13				S3 - Silty SAND (SM), fine to medium, 20-25% fines, 0-5% fine subangular gravel, olive gray, moist
		7	S4	11-13-13-14 (26)	24/23				S4 - Similar to S3
	710.0	9					Sand and Gravel		
10		10	S5	8-13-12-17 (25)	24/8				S5 - Similar to S3, 10-15% fine subangular gravel
		12				1			REMARK 1: Auger chattering between depths of 13 feet to 14 feet on possible cobbles or boulder.
	705.0								
15		15	S6	10-9-10-12 (19)	24/24				S6 - Silty SAND (SM), fine to medium, 30-35% fines, 0-5% fine subangular gravel, olive gray, moist
		17						17.0	
	700.0								Bottom of borehole at 17.0 feet. Borehole backfilled with the drill cuttings. Ground surface restored using concrete mix.
20									
	695.0								
25									

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from a drawing titled: "Existing Conditions Plan, 30 Thorndyke Road, Worcester, Massachusetts (Worcester County)," prepared by Brennan Consulting, dated August 21, 2024, and provided to LGCI by Mount Vernon Group Architects, Inc., via e-mail on August 22, 2024.

LGCI
Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Rd Suite 2
Billerica, MA 01862
Telephone: 9783305912
Fax: 9783305056

BORING LOG

B-3-OW

CLIENT: Mount Vernon Group Architects, Inc.
PROJECT NAME: Proposed Improvements - Thorndyke Road Elem. School
LGCI PROJECT NUMBER: 2424
PROJECT LOCATION: Worcester, MA

DATE STARTED: 7/24/24 **DATE COMPLETED:** 7/24/24
BORING LOCATION: Near proposed elevator
COORDINATES: NA
SURFACE El.: 716 ft. NAVD 88 (see note 1) **TOTAL DEPTH:** 22 ft.
WEATHER: 70's / Raining
GROUNDWATER LEVELS:
DURING DRILLING: 20.0 ft. / El. 696.0 ft. Based on sample moisture
AT END OF DRILLING: 21.0 ft. / El. 695.0 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Soil X, Corp.
DRILLING FOREMAN: Mike Houd
DRILLING METHOD: Hollow Stem Auger (4-1/4" I.D.)
DRILL RIG TYPE/MODEL: Mobile B-57 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: BH **CHECKED BY:** EP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark
	715.0	1				
		3	S1	7-8-4-8 (12)	24/14	
		5	S2	7-11-17-12 (28)	24/15	
5	710.0	7	S3	8-8-8-9 (16)	24/24	
		9	S4	10-8-15-18 (23)	24/8	
10	705.0	10	S5	10-13-17-23 (30)	24/24	
		12				
15	700.0	15	S6	9-14-16-20 (30)	24/24	
		17				
20	695.0	20	S7	10-15-21-21 (36)	24/24	
		22				
25						

Strata	Depth El.(ft.)	Material Description
Asphalt	0.6	Asphalt
Fill	715.4 1.3 714.7	S1 - Top 3": Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, 15-20% fine subangular gravel, trace of asphalt, dark brown, moist Bot. 11": Silty SAND (SM), fine to coarse, 20-25% fines, 5-10% fine subangular gravel, olive gray, moist
		S2 - Sandy SILT (ML), non-plastic, 35-40% fine to coarse sand, 5-10% fine subangular gravel, olive gray, moist
		S3 - Silty SAND (SM), fine to coarse, 25-30% fines, 5-10% fine subangular gravel, olive gray, moist
		S4 - Silty SAND with Gravel (SM), fine to coarse, 15-20% fines, 25-30% fine to coarse subangular gravel, trace of weathered rock, olive gray, moist
Sand and Gravel		S5 - Silty SAND (SM), fine to medium, trace coarse, 20-25% fines, 5-10% fine subangular gravel, olive gray, moist
		S6 - Silty SAND (SM), fine to medium, 25-30% fines, 0-5% fine subangular gravel, olive gray, moist
		S7 - Silty SAND (SM), fine to coarse, 25-30% fines, 10-15% fine subangular gravel, olive gray, moist to wet
	22.0	Bottom of borehole at 22.0 feet. Borehole backfilled with the drill cuttings, sand, and bentonite. Groundwater observation well installed in borehole.

GENERAL NOTES:

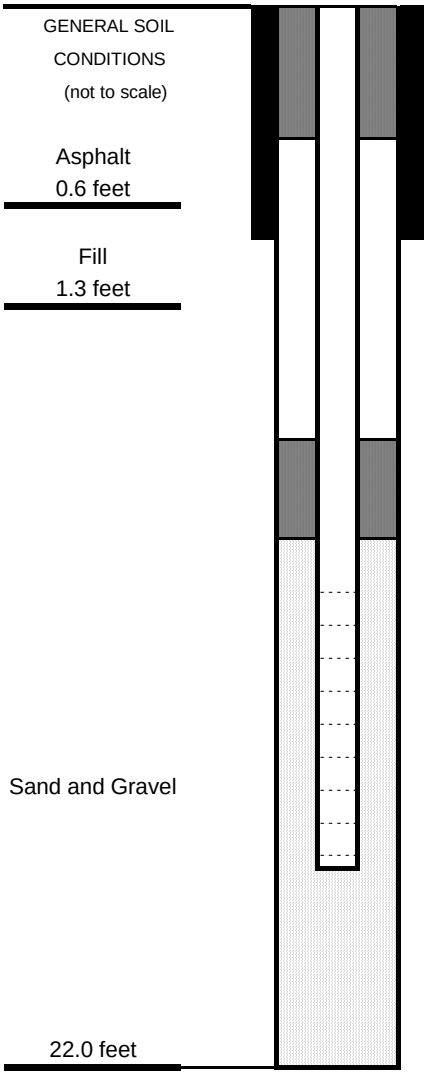
1. The ground surface elevation was interpolated to the nearest foot from a drawing titled: "Existing Conditions Plan, 30 Thorndyke Road, Worcester, Massachusetts (Worcester County)," prepared by Brennan Consulting, dated August 21, 2024, and provided to LGCI by Mount Vernon Group Architects, Inc., via e-mail on August 22, 2024.

Lahlaf Geotechnical Consulting, Inc.

GROUNDWATER OBSERVATION WELL INSTALLATION REPORT

Boring No. : **B-3-OW**

Project Name: **Prop. Improvements - Thorndyke Road Elementary School, Worcester, MA**	
LGCI Project Number: **2424**	
Client: **Mount Vernon Group Architects, Inc.**	
Drilling Subcontractor: Soil X	Date Started: 7/24/24
Drilling Foreman: Mike Houd	Date Completed: 7/24/24
LGCI Engineer: Mumin Berke Hatipoglu	Location: Near proposed elevator
Ground Surface Elevation: 716.0 feet	Total Depth of Boring: 22.0 feet
Groundwater Depth: 20.0 feet below ground surface	Drill Rig Type: Mobile Drill B-57 ATV
	Drilling Method: Hollow Stem Auger (4-1/4" I.D.)



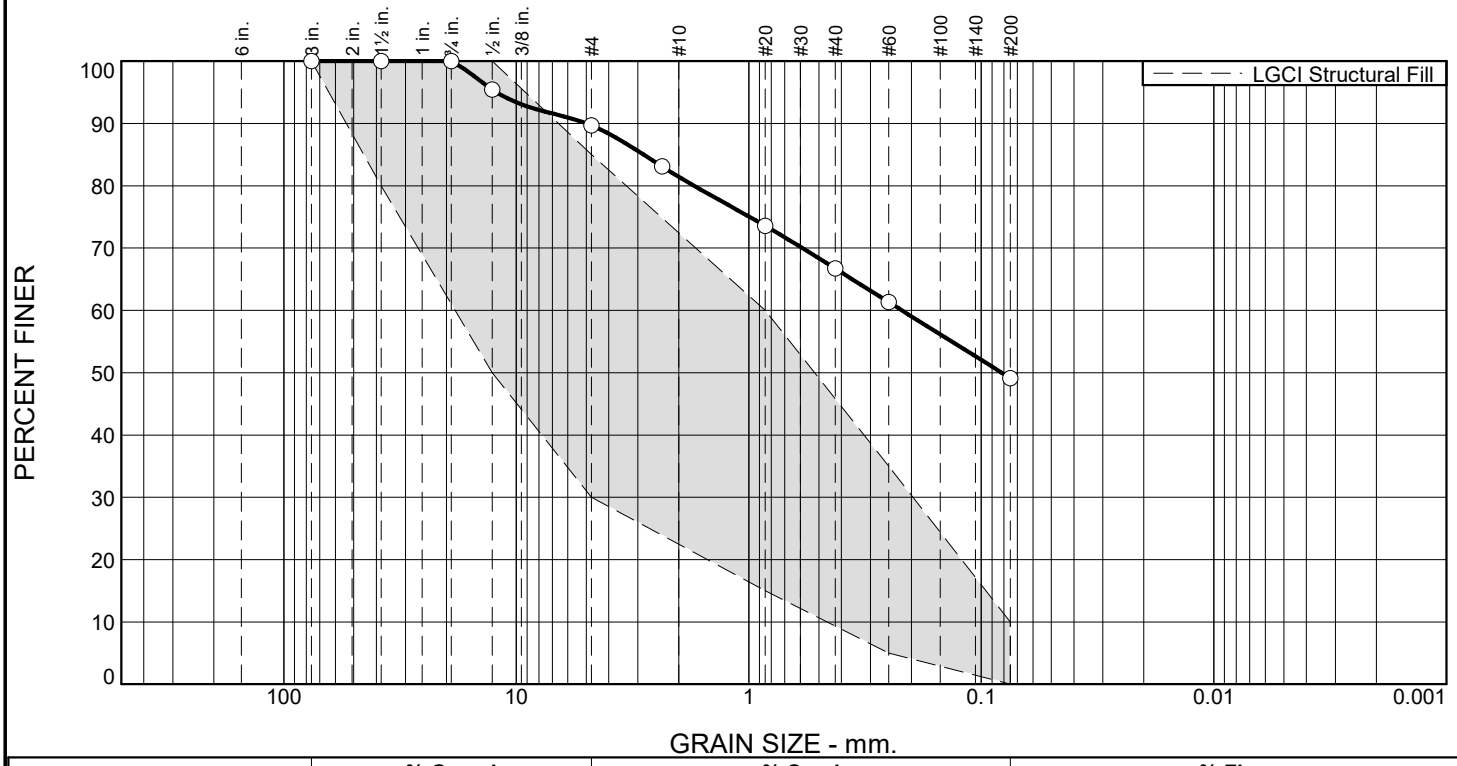
Riser Stickup 0.0 feet above ground surface

THICKNESS OF SURFACE SEAL	0.5 feet
TYPE OF SURFACE SEAL	Concrete
TYPE OF SURFACE CASING	Roadway Box
ID OF SURFACE CASING	5 inch
DEPTH TO BOTTOM OF CASING	0.8 feet
ID OF RISER PIPE	2 inch
TYPE OF RISER PIPE	Schedule 40 PVC
TYPE OF BACKFILL AROUND RISER PIPE	Filter sand
DEPTH TO TOP OF SEAL	7.0 feet
TYPE OF SEAL	Bentonite Chips
DEPTH TO BOTTOM OF SEAL	9.0 feet
DEPTH TO TOP OF PERVIOUS SECTION	10.0 feet
TYPE OF PERVIOUS SECTION	Schedule 40 PVC
DESCRIBE OPENINGS	0.01 inch slots
ID OF PERVIOUS SECTION	2 inch
TYPE OF BACKFILL AROUND PERVIOUS SECTION	Filter sand (Holliston sand)
DEPTH TO BOTTOM OF PERVIOUS SECTION	20.0 feet
DEPTH TO BOTTOM OF SAND COLUMN	22.0 feet
TYPE OF BACKFILL BELOW PERVIOUS SECTION	Filter sand (Holliston sand)
DIAMETER OF BOREHOLE	4 inch
DEPTH TO BOTTOM OF BOREHOLE	22.0 feet

NOTES: The ground surface elevation was interpolated to the nearest foot from drawing titled: " Existing Conditions Plan, 30 Thorndyke Road, Worcester, Massachusetts (Worcester County)," prepared by Brennan Consulting, dated August 21, 2024, and provided to LGCI by Mount Vernon Group Architects, Inc. via e-mail on August 22, 2024.

Appendix B – Laboratory Test Results

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	10.3	8.2	14.8	17.6	49.1	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3	100.0	100.0	
1.5	100.0	80.0 - 100.0	
0.75	100.0		
0.50	95.4	50.0 - 100.0	
#4	89.7	30.0 - 85.0	X
#8	83.1		
#20	73.6	15.0 - 60.0	X
#40	66.7		
#60	61.3	5.0 - 35.0	X
#200	49.1	0.0 - 10.0	X

* LGCI Structural Fill

Material Description

ASTM (D 2488) Classification: Silty SAND (SM), fine to coarse, 45-50% fines, 10-15% fine subangular gravel, trace of roots, brown

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS (D 2487)= AASHTO (M 145)=

Coefficients

D_{90}= 4.9856 D_{85}= 2.8353 D_{60}= 0.2193
D_{50}= 0.0817 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Fill sample.

Date Received: 7/24/24 **Date Tested:** 7/25/24

Tested By: SP

Checked By: JKW

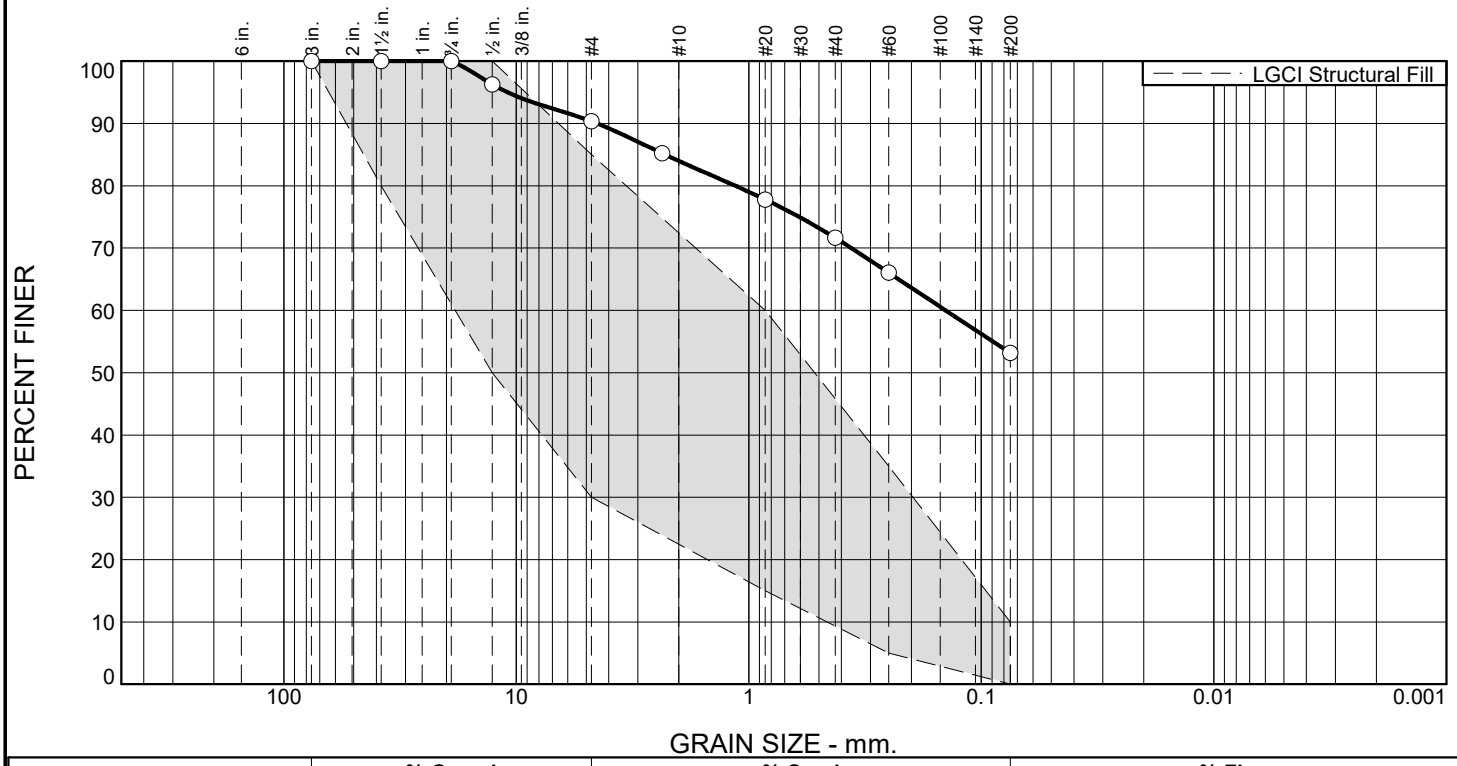
Location: Boring B-1
Sample Number: S1 Bot. 9" **Depth:** 0.0'-2.0'

Date Sampled: 7/24/24

LGCI
Lahlaf Geotechnical Consulting, Inc.

Client: Mount Vernon Group Architects, Inc.
Project: Prop. Improvements - Thorndyke Road Elementary School, Worcester, MA
Project No: 2424 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	9.6	6.4	12.3	18.5	53.2	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3	100.0	100.0	
1.5	100.0	80.0 - 100.0	
0.75	100.0		
0.50	96.3	50.0 - 100.0	
#4	90.4	30.0 - 85.0	X
#8	85.2		
#20	77.8	15.0 - 60.0	X
#40	71.7		
#60	66.1	5.0 - 35.0	X
#200	53.2	0.0 - 10.0	X

* LGCI Structural Fill

Material Description

ASTM (D 2488) Classification: Sandy SILT (ML), non-plastic, 35-40% fine to coarse sand, 5-10% fine subangular gravel, olive gray

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 4.4798 D_{85}= 2.2936 D_{60}= 0.1423
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Natural sand and gravel sample.

Date Received: 7/24/24 **Date Tested:** 7/25/24

Tested By: SP

Checked By: JKW

Location: Boring B-3-OW **Date Sampled:** 7/24/24
Sample Number: S2 **Depth:** 3.0'-5.0'

LGCI
Lahlaf Geotechnical Consulting, Inc.

Client: Mount Vernon Group Architects, Inc.
Project: Prop. Improvements - Thorndyke Road Elementary School, Worcester, MA
Project No: 2424 **Figure**

Lord Environmental
A Coneco Engineers & Scientists, Inc. Company

4 First Street
Bridgewater, MA 02324
Office: 508.697.3191
www.lordenv.com/www.Coneco.com

SOIL SAMPLING AND ANALYSES REPORT

Thorndyke Road School
30 Thorndyke Road
Worcester, Massachusetts

Prepared for:

Mr. William Peters
Mount Vernon Group, Inc.
178 Albion Street
Wakefield, MA 01880

Prepared by:

Lord Environmental, A Coneco Engineers & Scientists, Inc. Company
4 First Street
Bridgewater, Massachusetts 02324

Project # 12962

September 10, 2024

Lord Environmental
A Coneco Engineers & Scientists, Inc. Company

4 First Street
Bridgewater, MA 02324
Office: 508.697.3191
www.lordenv.com/www.Coneco.com

September 10, 2024

Mr. William Peters
Mount Vernon Group, Inc.
178 Albion Street
Wakefield, MA 01880

RE: Soil Sampling and Analyses:
Thorndyke Road School
30 Thorndyke Road
Worcester, Massachusetts

Dear Mr. Peters:

Per your request, Lord Environmental has completed sampling and analyses of soil samples collected at the Subject Property, the Thorndyke Road School, addressed 30 Thorndyke Road in Worcester, Massachusetts. A total of four soil samples were submitted for laboratory analyses. All submitted soil samples were analyzed for soil disposal characterization. The purpose of these services is to evaluate soil conditions relative to potential contamination and off-site disposal during site development.

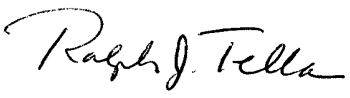
In summary, based on the scope of work completed, soil located in the area of the three soil borings, B-1, B-2, and B-3, have concentrations of arsenic above the MassDEP RCS-1 and RCS-2 Reportable Concentrations. However, the arsenic is naturally occurring on the Subject Property and therefore is excluded from MassDEP reporting requirements.

Based on the above, MassDEP notification is not required. Being exempt from notification does not exclude compliance with other regulatory requirements for disposal. The soil may be re-used on-site following best management practices. Should off-site disposal be desired, the soil would require disposal at a permitted facility.

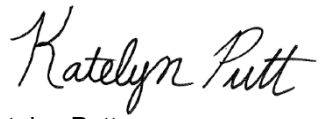
We appreciate the opportunity to have provided our professional environmental consulting services.

Sincerely,

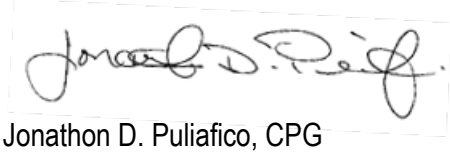
LORD ENVIRONMENTAL



Ralph Tella, CHMM, LSP
Principal



Katelyn Putt
Environmental Scientist



Jonathon D. Puliafico, CPG
Senior Project Manager

Enc.: Soil Sampling and Analyses Report

INTRODUCTION

Lord Environmental was engaged by Mount Vernon Group, Inc., to perform soil sampling at the Subject Property, the Thorndyke Road School, addressed 30 Thorndyke Road, Worcester, Massachusetts. The objective of the sampling and analyses was to evaluate soil conditions relative to potential contamination and off-site disposal options during site development.

All sampling and analyses were completed in accordance with standard industry practice, applicable regulations as defined by Chapter 21E of the Massachusetts General Laws and the Massachusetts Contingency Plan (MCP, 310 CMR 40.0000).

SITE DESCRIPTION AND VICINITY CHARACTERISTICS

Records at the Worcester Assessor's Office specify that the Subject Property is a 5.31-acre property designated Parcel 22-041-001. Development in the area is business and residential. Zoning of the Subject Property is Single-Family Residential (RS-7).Current use is as an elementary school.

According to the USGS Worcester, Massachusetts Quadrangle Topographical Map, the elevation of the Subject Property is approximately 720 feet above mean sea level. The topography of the Subject Property is relatively hilly with a slight slope to the east.

No pits, ponds or lagoons have been observed at the Subject Property. Review of the MADEP Priority Resource Map published by the MassDEP, indicates that the Site is not located in a potential drinking water area. The map also indicates that the Subject Property is in an area of protected open space.

Review of the Flood Insurance Rate Map published by the Federal Emergency Management Agency (FEMA) indicates that the Site is located in an Area of Minimal Flood Hazard. Review of the National Wetlands Inventory Map from the U.S Fish and Wildlife Service indicates that no wetlands exist on the Subject Property or on abutting properties.

SOIL SAMPLING AND SCREENING

Soil sampling was completed by Lahlaf Geotechnical Consulting, Inc. (LGCI) with three soil borings completed on July 24, 2024. Soil borings were performed by Soil -X Corporation with a B-57 ATV 4" auger drill rig. Locations of advanced soil borings are shown on the attached **Figure 1**.

The locations and depths of the soil borings were chosen based on the designed depths of future excavation for a handicap ramp and elevator depicted on the attached **Figure 1**. Boring logs completed by Lahlaf Geotechnical Consulting, Inc. (LGCI) are attached.

Soil samples were collected and screened for total organic vapors (TOV) by Lord Environmental using a photoionization detector via a modification of the MassDEP Jar Headspace method. TOV concentrations were measured in parts per million by volume (ppmv). No organic vapors were detected above the instrument detection limit (<0.1 ppm) in any of the soil samples screened.

SOIL ANALYSES

A total of four soil samples, fill material from soil borings B-1, B-2, and B-3, and a composite of native soil from B-1 – B-3 (soil sample B-1,2,3) were submitted to a state-certified laboratory for Comm-97 plus MCP 14 metals and hazardous waste characteristics for soil disposal characterization. Samples B-1, B-2 & B-3 submitted for volatile organic compound (VOC) analyses were "grab" samples, whereas the other parameters analyzed were composite samples made from similar soil descriptions at each location. The results of the laboratory testing were compared to both Massachusetts RCS-1 and RCS-2 Reportable Concentrations, Massachusetts lined and unlined landfill criteria, and the Dudley, MA Fish Road Soil Acceptance Criteria (SAC). **Table 1** enclosed is a summary of soil analyses.

No polychlorinated biphenyls (PCBs), total petroleum hydrocarbons (TPH), reactive cyanide, or reactive sulfide were detected above the laboratory detection limits in any of the four soil samples. No volatile organic compounds (VOCs) were detected in any of the four soil samples. However, five compounds had laboratory reporting limits above the Fish Road SAC. The Subject Property does not have a history to support the use of these VOCs on-site.

One semi-volatile organic compound (SVOC), naphthalene, was detected above the laboratory detection limits in soil boring B-2. Although naphthalene was detected in B-2, the compound was not detected above the MassDEP RCS-1 Reportable Concentrations or the Fish Road SAC. Additionally, sixteen SVOCs had reporting limits above the Fish Road SAC. However, none of the sixteen SVOCs with reporting limits higher than the SAC were detected in any of the four soil samples.

Eight metals were detected in all four soil samples. Concentrations of arsenic in all four of the soil samples exceeded the MassDEP RCS-1 and RCS-2 Reportable Concentrations. However, the Site is located within an area of naturally occurring arsenic and is therefore exempt from MassDEP notification. The concentrations of arsenic in all four soil samples are below the Fish Road SAC of less than 100 mg/kg, the highest concentration occurring in B-1 at 52.2 mg/kg.

Additionally, barium, beryllium, chromium, lead, nickel, vanadium, and zinc were detected in all four soil samples. However, all concentrations of these seven metals were detected below the MassDEP RCS-1 and RCS-2 Reportable Concentrations, as well as the Fish Road SAC.

1,4-Dioxane had a reporting limit above the Fish Road SAC. However, 1,4-Dioxane was not detected in any of the four soil samples. No oxygenates were detected above laboratory detection limits in any of the four soil samples.

In summary, based on the above, MassDEP notification is not required. Being exempt from notification does not exclude compliance with other regulatory requirements for disposal. The soil may be re-used on-site following best management practices. Should off-site disposal be desired, the soil would require disposal at a permitted facility.

Please contact us if you have any questions.

Enc.: Figure 1: Boring Location Plan
Table 1: Soil Analyses Results
Boring Logs
Laboratory Analysis Report

LIMITATIONS

Professional services rendered by Coneco have been performed and findings obtained in accordance with customary principles and practices in the fields of environmental science and engineering. This statement is in lieu of other statements either expressed or implied. Coneco is not responsible for the independent conclusions, opinions or recommendations made by others based on the records review or subject property observations presented in this report.

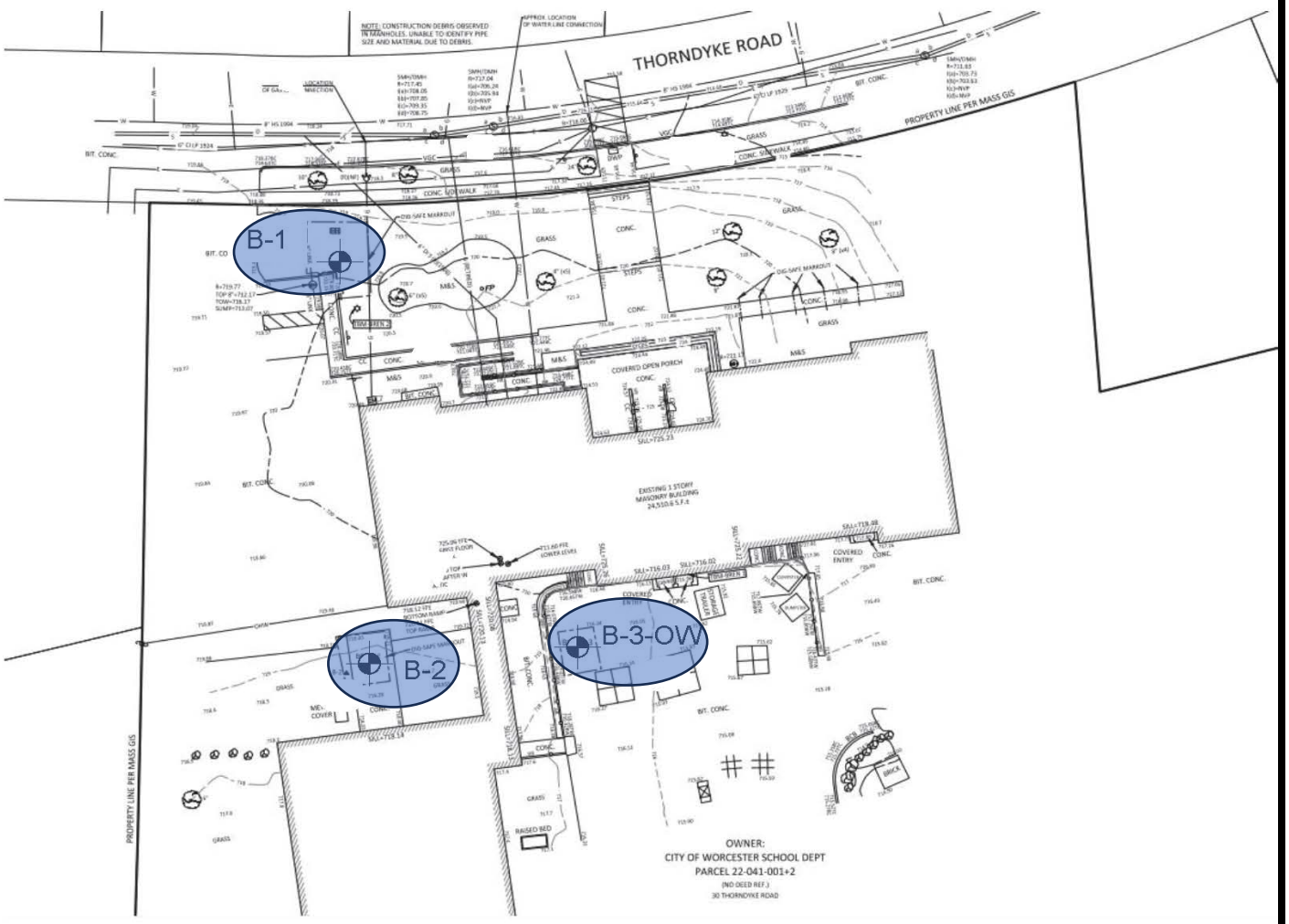
It should be noted that environmental evaluations are inherently limited in the sense that conclusions are drawn, and recommendations developed from information obtained from limited research and subject property evaluation. No such evaluation can absolutely rule out the existence of hazardous materials at a given site. For these types of evaluations, it is often necessary to use information prepared by others. As such, Coneco cannot be responsible for the accuracy of such information.

Additionally, activities occurring throughout time may result in a change in the environmental characteristics at this Subject Property and surrounding properties. This report does not warrant against future operations or conditions, nor does this warrant operations or conditions present of a type or at a location not investigated. This report is not a regulatory compliance audit and is not intended to satisfy the requirements of any state, federal, or local real estate transfer laws.

This report is intended for the sole use of the client and duly appointed parties. This report may not be used or relied upon by any other party without the written consent of Coneco. The scope of services performed in execution of this evaluation may not be appropriate to satisfy the needs of other users and use or re-use of this document or the findings, conclusions, or recommendations is at the risk of said user.

Legend

Approximate location of borings advanced by Soil X, Corp. of Leominster, MA on July 24, 2024, and observed by Lahlaf Geotechnical Consulting, Inc. (LGCI).



MASSACHUSETTS COORDINATE SYSTEM NAD 83, MAINLAND ZONE

Approximate Scale (ft.)

20 0 10 20 40 80

Note

Figure based on drawing titled: "Existing Conditions Plan, 30 Thorndyke Road, Worcester, Massachusetts (Worcester County)," prepared by Brennan Consulting, dated August 21, 2024, and provided to LGCI by Mount Vernon Group Architects, Inc., via e-mail on August 22, 2024.

Client:	Project:	
Mount Vernon Group Architects, Inc.	Proposed Improvements – Thorndyke Road Elementary School	Figure 3 – Boring Location Plan
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Worcester, MA	LGCI Project No.: 2424 / Date: Sept. 2024

LORD ENVIRONMENTAL

A Coneco Engineers & Scientists, Inc. Company

4 First Street
Bridgewater, MA 02324
508-697-3191

REFERENCE:

Lahlaf Geotechnical Consulting, Inc. Geotechincal Report, Figure 3 - Boring Location Plan

FIGURE 1: Boring Location Plan

THORNDIKE ROAD SCHOOL
WORCESTER, MASSACHUSETTS

Table 1
Comm-97 with MCP-14 Metals - Laboratory Analysis Results
Thorndyke Road School - 30 Thorndyke Road, Worcester, MA

	Sample Collection Date							B-1 8/7/2024		B-2 8/7/2024		B-3 8/7/2024		B-1,2,3 8/7/2024	
	Matrix							SOIL		SOIL		SOIL		SOIL	
	CAS	Units	RCS-1	RCS-2	LL	UL	Fish Road SAC	Result	RL	Result	RL	Result	RL	Result	RL
Miscellaneous/Inorganics															
Percent Solid	PHNX - PCTSOLID	%					No Free Liquids	93		96		90		90	
Corrosivity	PHNX - CORROSIVITY	Pos/Neg	Negative				Negative	Negative		Negative		Negative		Negative	
Flash Point	PHNX - FLASH POINT	Degree F	Non-Ignitable				Non-Ignitable	>200	200	>200	200	>200	200	>200	200
Ignitability	PHNX - IGNITABILITY	degree F	>140F				>140F	Passed	140	Passed	140	Passed	140	Passed	140
pH at 25C - Soil	PHNX - PH	pH Units	>2.0 or <12.5 S.U.				5 to 9 S.U.	8.5	1.00	8.28	1.00	7.58	1.00	7.88	1.00
Reactivity - Cyanide	PHNX - REACT CYANIDE	mg/kg	Non-Reactive				<250	<10	10	<10	10	<10	10	<10	10
Reactivity Sulfide	PHNX - REACT SULFIDE	mg/kg	Non-Reactive				<500	<20	20	<20	20	<20	20	<20	20
Reactivity	PHNX - REACTIVITY	Pos/Neg	Negative				None	Negative		Negative		Negative		Negative	
Metals, Total															
Antimony	7440-36-0	mg/kg	20	40			10	<3.1	3.0	<3.1	3.0	<3.1	3.0	<3.1	3.1
Arsenic	7440-38-2	mg/kg	20	40	40	40	<100	4.0	3.0	3.0	3.0	3.0	3.0	2.9	3.0
Barium	7440-39-3	mg/kg	1000	1000			375	52.5	0.34	46.1	0.35	77.6	0.34	31.2	0.33
Beryllium	7440-41-7	mg/kg	100	200			4	0.61	0.17	0.60	0.17	0.73	0.17	0.33	0.16
Cadmium	7440-43-9	mg/kg	80	80	80	30	20	< 0.34	0.34	< 0.36	0.36	< 0.34	0.34	< 0.33	0.33
Chromium	7440-47-3	mg/kg	100	200	1000	1000	100	16.5	0.34	23.3	0.36	18.0	0.34	12.4	0.33
Lead	7439-92-1	mg/kg	200	400	3200	1000	200	48.4	0.34	7.60	0.36	7.31	0.34	6.89	0.33
Mercury	7439-97-6	mg/kg	20	40	10	10	3	< 0.03	0.03	< 0.03	0.03	< 0.03	0.03	< 0.03	0.03
Nickel	7440-02-0	mg/kg	700	1000			150	16.5	1.4	24.0	1.4	15.9	1.4	13.1	1.3
Selenium	7782-49-2	mg/kg	400	800			5	< 1.3	1.3	< 1.4	1.4	< 1.4	1.4	< 1.3	1.3
Silver	7440-22-4	mg/kg	100	200			6	< 0.34	0.34	< 0.36	0.36	< 0.34	0.34	< 0.33	0.33
Thallium	7440-28-0	mg/kg	8	70			6	< 1.0	1.0	< 1.2	1.2	< 1.1	1.1	< 1.0	1.0
Vanadium	7440-62-2	mg/kg	500	800			225	26.0	1.4	25.0	1.4	28.7	1.4	19.9	1.3
Zinc	7440-66-6	mg/kg	1000	4000			500	39.2	0.7	40.6	0.7	47.2	0.7	44.2	0.7
TPH By SW8015D															
Fuel Oil #2 / Diesel Fuel	68476-30-2	mg/kg						< 53	53	< 54	54	< 54	54	< 55	55
Fuel Oil #4	68476-31-3	mg/kg						< 53	53	< 54	54	< 54	54	< 55	55
Fuel Oil #6	68553-00-4	mg/kg						< 53	53	< 54	54	< 54	54	< 55	55
Kerosene	8008-20-6	mg/kg						< 53	53	< 54	54	< 54	54	< 55	55
Motor Oil	PHNX - MOTOR OIL	mg/kg						< 53	53	< 54	54	< 54	54	< 55	55
Total TPH	PHNX - TPH	mg/kg	1000	3000	5000	2500		< 53	53	< 54	54	< 54	54	< 55	55
Unidentified	PHNX - OTHER OIL	mg/kg						< 53	53	< 54	54	< 54	54	< 55	55
PCBs By SW8082A															
PCB-1016	12674-11-2	ug/kg	1000	4000	2000	2000		< 71	71	< 72	72	< 72	72	< 73	73
PCB-1221	11104-28-2	ug/kg	1000	4000	2000	2000		< 71	71	< 72	72	< 72	72	< 73	73
PCB-1232	11141-16-5	ug/kg	1000	4000	2000	2000		< 71	71	< 72	72	< 72	72	< 73	73
PCB-1242	53469-21-9	ug/kg	1000	4000	2000	2000		< 71	71	< 72	72	< 72	72	< 73	73
PCB-1248	12672-29-6	ug/kg	1000	4000	2000	2000		< 71	71	< 72	72	< 72	72	< 73	73
PCB-1254	11097-69-1	ug/kg	1000	4000	2000	2000		< 71	71	< 72	72	< 72	72	< 73	73
PCB-1260	11096-82-5	ug/kg	1000	4000	2000	2000		< 71	71	< 72	72	< 72	72	< 73	73
PCB-1262	37324-23-5	ug/kg	1000					< 71	71	< 72	72	< 72	72	< 73	73
PCB-1268	11100-14-4	ug/kg	1000					< 71	71	< 72	72	< 72	72	< 73	73
Total PCBs		ug/kg					100								
Volatiles By SW8260D															
1,1,1,2-Tetrachloroethane	630-20-6	ug/kg	100	100			10	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
1,1,1-Trichloroethane	71-55-6	ug/kg	80000	680000			3,000	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
1,1,2,2-Tetrachloroethane	79-34-5	ug/kg	1	10			0.5	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
1,1,2-Trichloroethane	79-00-5	ug/kg	100	1000			10	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
1,1-Dichloroethane	75-34-3	ug/kg	400	9000			40	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
1,1-Dichloroethene	75-35-4	ug/kg	8000	80000			200	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
1,1-Dichloropropene	563-58-6	ug/kg					1	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
1,2,3-Trichlorobenzene	87-61-6	ug/kg					NS	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
1,2,3-Trichloropropane	96-18-4	ug/kg	100000	1900000			10,000	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
1,2,4-Trichlorobenzene	120-82-1	ug/kg	2000	9000			200	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
1,2,4-Trimethylbenzene	95-63-6	ug/kg	10000000	10000000			100,000	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
1,2-Dibromo-3-chloropropane	96-12-8	ug/kg	10000	10000			1,000	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
1,2-Dibromoethane	106-93-4	ug/kg	100	100			10	< 0.38	0.38	< 0.50	0.50	< 0.42	0.42	< 0.46	0.46
1,2-Dichlorobenzene	95-50-1	ug/kg	90000	1000000			600	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
1,2-Dichloroethane	107-06-2	ug/kg	100	100			10	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
1,2-Dichloropropane	78-87-5	ug/kg	100	100			10	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
1,3,5-Trimethylbenzene	108-67-8	ug/kg	10000	1000000			1,000	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
1,3-Dichlorobenzene	541-73-1	ug/kg	3000	300000			300	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
1,3-Dichloropropane	142-28-9	ug/kg	500000	5000000			50,000	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
1,4-Dichlorobenzene	106-46-7	ug/kg	700	1000			70	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
2,2-Dichloropropane	594-20-7	ug/kg					10	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
2-Chlorotoluene	95-49-8	ug/kg	1000000	10000000			10,000	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
2-Hexanone	591-78-6	ug/kg	1000000	10000000			10,000	< 10	10	< 25	25	< 21	21	< 23	23
2-Isopropyltoluene	527-84-4	ug/kg					NS	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
4-Chlorotoluene	106-43-4	ug/kg					1,000	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
4-Methyl-2-pentanone	108-10-1	ug/kg	400	50000			40	< 10	10	< 25	25	< 21	21	< 23	23
Acetone	67-64-1	ug/kg	8000	50000			800	< 200	200	< 250	250	< 210	210	< 230	230
Acrylonitrile	107-13-1	ug/kg	100000	1900000			10,000	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
Benzene	71-43-2	ug/kg	2000	300000			200	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
Bromobenzene	108-86-1	ug/kg	100000	1900000			10,000	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
Bromochloromethane	74-97-5	ug/kg					NS	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
Bromodichloromethane	75-27-4	ug/kg	100	100			10	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
Bromoform	75-25-2	ug/kg	100	1000			10	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
Bromomethane	74-83-9	ug/kg	500	500			50	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
Carbon Disulfide	75-15-0	ug/kg	1000000	10000000			10,000	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
Carbon tetrachloride	56-23-5	ug/kg	5000	5000			500	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
Chlorobenzene	108-90-7	ug/kg	1000	3000			100	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
Chloroethane	75-00-3	ug/kg	100000	1900000			10,000	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
Chloroform	67-66-3	ug/kg	200	200			20	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
Chloromethane	74-87-3	ug/kg	100000	1900000			10,000	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
cis-1,2-Dichloroethene	156-59-2	ug/kg	100	100			10	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
cis-1,3-Dichloropropene	10061-01-5	ug/kg	10	100			1	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
Dibromochloromethane	124-48-1	ug/kg	5	90			0.5	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
Dibromomethane	74-95-3	ug/kg	500000	5000000			50,000	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
Dichlorodifluoromethane	75-71-8	ug/kg	1000000	10000000			100,000	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
Ethylbenzene	100-41-4	ug/kg	40000	1000000			4,000	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
Hexachlorobutadiene	87-68-3	ug/kg	30000	300000			3,000	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
Isopropylbenzene	98-82-8	ug/kg	1000000	1900000			100,000	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
m&p-Xylene	179601-23-1	ug/kg	100000	1900000			10,000	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
Methyl Ethyl Ketone	78-93-3	ug/kg	4000	50000			400	< 20	20	< 50	50	< 42	42	< 46	46
Methyl t-butyl ether (MTBE)	1634-04-4	ug/kg	100	1900000			10	< 7.1	7.1	< 10	10	< 8.4	8.4	< 9.2	9.2
Methylene chloride	75-09-2	ug/kg	100	3000			10	< 7.1	7.1	< 10	10	< 8.4	8.4	< 9.2	9.2
Naphthalene	91-20-3	ug/kg					NS	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
n-Butylbenzene	104-51-8	ug/kg	100000	1000000			10,000	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
n-Propylbenzene	103-65-1	ug/kg	40000	200000			400	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
o-Xylene	95-47-6	ug/kg	100000	1900000			10,000	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
p-Isopropyltoluene	99-87-6	ug/kg	100000	1900000			10,000	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
sec-Butylbenzene	135-98-8	ug/kg					NS	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
Styrene	100-42-5	ug/kg	3000	4000			300	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
tert-Butylbenzene	98-06-6	ug/kg	100000	1900000			10,000	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
Tetrachloroethene	127-18-4	ug/kg	1000	4000			100	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
Tetrahydrofuran (THF)	109-99-9	ug/kg	500000	5000000			50,000	< 2.0	2.0	< 10	10	< 8.4	8.4	< 9.2	9.2
Toluene	108-88-3	ug/kg	80000	1000000			1,000	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
Total Xylenes	1330-20-7	ug/kg	100000	1900000			10,000	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
trans-1,2-Dichloroethene	156-60-5	ug/kg	1000	1000			100	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
trans-1,3-Dichloropropene	10061-02-6	ug/kg	10	100			1	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
trans-1,4-dichloro-2-butene	110-57-6	ug/kg	10000	100000			1,000	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
Trichloroethene	79-01-6	ug/kg	300	300			30	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
Trichlorofluoromethane	75-69-4	ug/kg	1000000	10000000			100,000	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
Trichlorotrifluoroethane	76-13-1	ug/kg					NS	< 7.1	7.1	< 10	10	< 8.4	8.4	< 9.2	9.2
Vinyl chloride	75-01-4	ug/kg	300	700			70	< 2.0	2.0	< 5.0	5.0	< 4.2	4.2	< 4.6	4.6
Semivolatiles By SW8270E															
1,1-Biphenyl	92-52-4	ug/kg	50	6000			50	< 50	50	< 50	50	< 50	50	< 50	55
1,2,4,5-Tetrachlorobenzene	95-94-3	ug/kg	1000000	10000000			100,000	< 250	250	< 250	250	< 250	250	< 260	260
1,2,4-Trichlorobenzene	120-82-1	ug/kg	2000	6000			200	< 250	250	< 250	250	< 250	250	< 260	260
1,2-Dichlorobenzene	95-50-1	ug/kg	90000	900000			900	< 250	250	< 250	250	< 250	250	< 260	260
1,2-Diphenylhydrazine	122-66-7	ug/kg	60000	600000			5,000	< 360	360	< 360	360	< 360	360	< 360	360
1,3-Dichlorobenzene	541-73-1	ug/kg	3000	300000			300	< 250	250	< 250	250	< 250	250	< 260	260
1,4-Dichlorobenzene	106-46-7	ug/kg	700	1000			70	< 250	250	< 250	250	< 250	250	< 260	260
2,2'-Oxybis(1-Chloropropane)	108-60-1	ug/kg	700	700			NS	< 250	250	< 250	250	< 250	250	< 260	260
2,4,5-Trichlorophenol	95-95-4	ug/kg	4000	40000			400	< 250	250	< 250	250	< 250	250	< 260	260
2,4,6-Trichlorophenol	88-06-2	ug/kg	700	30000			70	< 250	250	< 250	250	< 250	250	< 260	260
2,4-Dichlorophenol	120-83-2	ug/kg	700	80000			70	< 250	250	< 250	250	< 250	250	< 260	260
2,4-Dimethylphenol	105-67-9	ug/kg	700	300000			70	< 250	250	< 250	250	< 250	250	< 260	260
2,4-Dinitrophenol	51-28-5	ug/kg	3000	50000			300	< 360	360	< 360	360	< 360	360	< 360	360
2,6-Dinitrotoluene	121-14-2	ug/kg	700	90000			70	< 250	250	< 250	250	< 250	250	< 260	260
2-Chloronaphthalene	91-58-7	ug/kg	1000000	10000000			10,000	< 250	250	< 250	250	< 250	250	< 260	260
2-Methylnaphthalene	91-57-6	ug/kg	700	80000			700	< 250	250	< 250	250	< 250	250	< 260	260
2-Nitroaniline	88-74-4	ug/kg	1000000	10000000			100,000	< 250	250	< 250	250	< 250	250	< 260	260
2-Nitrophenol	88-75-5	ug/kg	100000	1000000			10,000	< 250	250	< 250	250	< 250	250	< 260	260
3&4-Methylphenol (m&p-cresol)	PHNX - M&P CRESOL	ug/kg					50,000	< 360	360	< 360	360	< 360	360	< 360	360
3,3'-Dichlorobenzidine	91-94-1	ug/kg	3000	20000			300	< 250	250	< 250	250	< 250	250	< 260	260
3-Nitroaniline	99-09-2	ug/kg					NS	< 360	360	< 360	360	< 360	360	< 360	360
4,6-Dinitro-2-methylphenol	534-52-1	ug/kg	50000	500000			5000	< 360	360	< 360	360	< 360	360	< 360	360
4-Bromophenyl phenyl ether	101-55-3	ug/kg	1000000	10000000			10,000	< 250	250	< 250	250	< 250	250	< 260	260
4-Chloro-3-methylphenol	59-50-7	ug/kg	1000000	10000000			100,000	< 250	250	< 250	250	< 250	250	< 260	260
4-Chloroaniline	106-47-8	ug/kg	1000	9000			100	< 250	250	< 250	250	< 250	250	< 260	260
4-Chlorophenyl phenyl ether	7005-72-3	ug/kg	1000000	10000000			100,000	< 250	250	< 250	250	< 250	250	< 260	260
4-Nitroaniline	100-01-6	ug/kg	1000000	10000000			100,000	< 250	250	< 250	250	< 250	250	< 260	260
4-Nitrophenol	100-02-7	ug/kg	100000	1000000			10,000	< 250	250	< 250	250	< 250	250	< 260	260
Acenaphthene	83-32-9	ug/kg	4000	300000			4,000	< 250	250	< 250	250	< 250	250	< 260	260
Acenaphthylene	208-96-8	ug/kg	2000	90000			1,000	< 250	250	< 250	250	< 250	250	< 260	260
Acetophenone	98-86-2	ug/kg	1000000	10000000			100,000	< 250	250	< 250	250	< 250	250	< 260	260
Aniline	62-53-3	ug/kg	1000000	10000000			100,000	< 360	360	< 360	360	< 360	360	< 360	360
Anthracene	120-12-7	ug/kg	1000000	10000000			10,000	< 250	250	< 250	250	< 250	250	< 260	260
Benz(a)anthracene	56-55-3	ug/kg	20000	300000			7,000	< 250	250	< 250	250	< 250	250	< 260	260
Benzaldehyde	92-87-5	ug/kg	10000	100000			5,000	< 250	250	< 250	250	< 250	250	< 260	260
Benzo(a)pyrene	50-32-8	ug/kg	2000	30000			2,000	< 250	250	< 250	250	< 250	250	< 260	260
Benzo(b)fluoranthene	205-99-2	ug/kg	20000	300000			7,000	< 250	250	< 250	250	< 250	250	< 260	260
Benzo(g,h,i)perylene	191-24-2	ug/kg	1000000	10000000			10,000	< 250	250	< 250	250	< 250	250	< 260	260
Benzo(k)fluoranthene	207-08-9	ug/kg	200000	3000000			10,000	< 250	250	< 250	250	< 250	250	< 260	260
Benzoic acid	65-85-0	ug/kg	1000000	10000000			100,000	< 710	710	< 710	710	< 720	720	< 730	730
Benzyl butyl phthalate	85-68-7	ug/kg	100000	1000000			10,000	< 250	250	< 250	250	< 250	250	< 260	260
Bis(2-chloroethoxy)methane	111-91-1	ug/kg	500000	5000000			50,000	< 250	250	< 250	250	< 250	250	< 260	260
Bis(2-chloroethyl)ether	111-44-4	ug/kg	700	700			70	< 360	360	< 360	360	< 360	360	< 360	360
Bis(2-ethylhexyl)phthalate	117-81-7	ug/kg	100000	700000			5,000	< 360	360	< 360	360	< 360	360	< 360	360
Carbazole	86-74-8	ug/kg					NS	< 360	360	< 360	360	< 360	360	< 360	360
Chrysene	218-01-9	ug/kg	200000	3000000			20,000	< 250	250	< 250	250	< 250	250	< 260	260
Dibenz(a,h)anthracene	53-70-3	ug/kg	10000	300000			5,000	< 250	250	< 250	250	< 250	250	< 260	260
Dibenzofuran	132-64-9	ug/kg	1000000	10000000			100,000	< 250	250	< 250	250	< 250	250	< 260	260
Diethyl phthalate	84-66-2	ug/kg	2000	90000			700	< 250	250	< 250	250	< 250	250	< 260	260
Dimethylphthalate	131-11-3	ug/kg	1000000	10000000			10,000	< 250	250	< 250	250	< 250	250	< 260	260
Di-n-butylphthalate	84-74-2	ug/kg	90000	900000			1,000	< 360	360	< 360	360	< 360	360	< 360	360
Di-n-octylphthalate	117-84-0	ug/kg	10000	100000			70	< 250	250	< 250	250	< 250	250	< 260	260
Fluoranthene	206-44-0	ug/kg	1000000	10000000			40,000	< 250	250	< 250	250	< 250	250	< 260	260
Fluorene	86-73-7	ug/kg	1000000	10000000			10,000	< 250	250	< 250	250	< 250	250	< 260	260
Hexachlorobenzene	118-74-1	ug/kg	700	900			70	< 250	250	< 250	250	< 250	250	< 260	260
Hexachlorobutadiene	87-68-3	ug/kg	30000	300000			3,000	< 250	250	< 250	250	< 250	250	< 260	260
Hexachlorocyclopentadiene	77-47-4	ug/kg	50000	500000			5,000	< 250	250	< 250	250	< 250	250	< 260	260
Hexachloroethane	67-72-1	ug/kg	700	3000			70	< 250	250	< 250	250	< 250	250	< 260	260
Indeno(1,2,3-cd)pyrene	193-39-5	ug/kg	20000	300000			7,000	< 250	250	< 250	250	< 250	250	< 260	260
Isophorone	78-59-1	ug/kg	100000	1900000			10,000	< 250	250	< 250	250	< 250	250	< 260	260
Naphthalene	91-20-3	ug/kg	90000	900000			5,000	< 250	250	< 250	250	< 250	250	< 260	260
Nitrobenzene	98-95-3	ug/kg	50000	500000			5,000	< 250	250	< 250	250	< 250	250	< 260	260
n-Nitrosodimethylamine	62-75-9	ug/kg	100000	1000000			10,000	< 360	360	< 360	360	< 360	360	< 360	360
n-Nitrosodi-n-propylamine	621-64-7	ug/kg	4000	30000			4,000	< 250	250	< 250	250	< 250	250	< 260	260
n-Nitrosodiphenylamine	86-30-6	ug/kg	1000000	10000000			10,000	< 250	250	< 250	250	< 250	250	< 260	260
Pentachloronitrobenzene	82-68-8	ug/kg	100000	1000000			10,000	< 360	360	< 360	360	< 360	360	< 360	360
Pentachlorophenol	87-86-5	ug/kg	3000	30000			300	< 360	360	< 360	360	< 360	360	< 360	360
Phenanthrene	85-01-8	ug/kg	90000	1000000			10,000	< 250	250	< 250	250	< 250	250	< 260	260
Phenol	108-95-2	ug/kg	300	10000			100	< 250	250	< 250	250	< 250	250	< 260	260
Pyrene	129-00-0	ug/kg	1000000	10000000			40,000	< 250	250	< 250	250	< 250	250	< 260	260
Pyridine	110-86-1

L12962

LGCI
Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Rd.
North Billerica, MA 01862
Telephone: 9783305912
Fax: 9783305056

BORING LOG

DRAFT

B-1
PAGE 1 OF 1

CLIENT: Mount Vernon Group Architects, Inc.
PROJECT NAME: Proposed Improvements Thorndyke Road
LGCI PROJECT NUMBER: 2424
PROJECT LOCATION: Worcester, MA

DATE STARTED: 7/24/24 **DATE COMPLETED:** 7/24/24
BORING LOCATION:
COORDINATES: NA
SURFACE El.: (see note 1) **TOTAL DEPTH:** 9 ft.
WEATHER: 70's / Raining
GROUNDWATER LEVELS:
DURING DRILLING: NE
AT END OF DRILLING: NE
OTHER: -

DRILLING SUBCONTRACTOR: SoilX Corp.
DRILLING FOREMAN: Mike Houd
DRILLING METHOD: 4" Auger
DRILL RIG TYPE/MODEL: B-57 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.:
CORE BARREL SIZE:
LOGGED BY: MBH **CHECKED BY:** EP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El. (ft.)	Material Description
0		0.5	S1				Topsoil	0.5	S1 - Top 1": Topsoil
			S1	3-11-12-10 (23)	24/10		Fill	2.0	S1 - Bottom 9": Sandy SILT (ML), nonplastic, 40-45% fine to coarse sand, 10-15% fine subangular gravel, trace of roots, brown, moist
2		2	S2	8-7-9-10 (16)	24/2		Sand and Gravel		S2 - Silty SAND (SM), fine to medium, 15-20% fines, 5-10% fine subangular gravel, brown, moist
4		4	S3	11-12-15-14 (27)	24/4				S3 - Similar to S2
5		6	S4	14-13-15-41 (28)	24/20				S4 - Silty SAND with Gravel (SM), 20-25% fines, 15-20% fine to coarse subangular gravel, olive brown, moist
		8				1			REMARK 1: Auger chattering observed on possible boulder at a depth of 8 feet.
10						2		9.0	REMARK 2: Auger shifted east due to contact with possible boulder due to proximity of utilities. Borehole terminated at a depth of 9 feet.
15									Bottom of borehole at 9.0 feet. Bottom of borehole at 9.0 feet.
20									
25									

GENERAL NOTES:

LGCI
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BORING LOG

DRAFT

B-2
PAGE 1 OF 1

CLIENT: Mount Vernon Group Architects, Inc.
PROJECT NAME: Proposed Improvements Thorndyke Road
LGCI PROJECT NUMBER: 2424
PROJECT LOCATION: Worcester, MA

DATE STARTED: 7/24/24 **DATE COMPLETED:** 7/24/24
BORING LOCATION:
COORDINATES: NA
SURFACE El.: (see note 1) **TOTAL DEPTH:** 17 ft.
WEATHER: 70's / Raining
GROUNDWATER LEVELS:
DURING DRILLING: NE
AT END OF DRILLING: NE - borehole sit for 15 min
OTHER: -

DRILLING SUBCONTRACTOR: SoilX Corp.
DRILLING FOREMAN: Mike Houd
DRILLING METHOD: 4" Auger
DRILL RIG TYPE/MODEL: B-57 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.:
CORE BARREL SIZE:
LOGGED BY: MBH **CHECKED BY:** EP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0.7	S1	3-3-2-2 (5)	24/11		Concrete	0.7	Top 8": Concrete
		2.7	S1				Fill	1.6	S1 - Top 7": Well-Graded SAND with Silt (SW-SM), fine to coarse, 10-15% fines, 5-10% fine subangular gravel, dark brown, moist
		3	S2	5-13-13-14 (26)	24/2				S1 - Bottom 4": Silty SAND (SM), fine to medium, trace coarse, ~20% fines, 0-5% fine subangular gravel, brown to olive grey, moist S2 - Similar to S1 Bottom 4", little to no recovery
5		5	S3	11-11-10-10 (21)	24/13				S3 - Silty SAND (SM), fine to medium, 20-25% fines, 0-5% fine subangular gravel, olive, moist
		7	S4	11-13-13-14 (26)	24/23				S4 - Similar to S3
10		9					Sand and Gravel		
		10	S5	8-13-12-17 (25)	24/8				S5 - Similar to S3, 10-15% gravel
		12				1			REMARK 1: Auger chattering observed from 13 feet to 14 feet on possible cobbles or boulder.
15		15	S6	10-9-10-12 (19)	24/24				S6 - Silty SAND (SM), fine to medium, 30-35% fines, 0-5% fine subangular gravel, olive to grey, moist
		17						17.0	Bottom of borehole at 17.0 feet. Bottom of borehole at 17.0 feet. Backfilled the borehole with drill cuttings. Concrete restored using concrete mix.
20									
25									

GENERAL NOTES:

LGCI
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BORING LOG

DRAFT

B-3-OW
PAGE 1 OF 1

CLIENT: Mount Vernon Group Architects, Inc.
PROJECT NAME: Proposed Improvements Thorndyke Road
LGCI PROJECT NUMBER: 2424
PROJECT LOCATION: Worcester, MA

DATE STARTED: 7/24/24 **DATE COMPLETED:** 7/24/24
BORING LOCATION:
COORDINATES: NA
SURFACE El.: (see note 1) **TOTAL DEPTH:** 22 ft.
WEATHER: 70's / Raining
GROUNDWATER LEVELS:
▽ **DURING DRILLING:** 20.0 ft. Based on sample moisture.
▼ **AT END OF DRILLING:** 21.0 ft. Water buildup on bottom of auger after 15 min
▼ **OTHER:** -

DRILLING SUBCONTRACTOR: SoilX Corp.
DRILLING FOREMAN: Mike Houd
DRILLING METHOD: 4" Auger
DRILL RIG TYPE/MODEL: B-57 ATV
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.:
CORE BARREL SIZE:
LOGGED BY: MBH **CHECKED BY:** EP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0.9	S1	7-8-4-8 (12)	24/14		Asphalt	0.6	Top 7": Asphalt
		2.9	S1				Fill	1.3	S1 - Top 3": Well-Graded SAND with SIlt and Gravel (SW-SM), fine to coarse, 5-10% fines, 15-20% fine subangular gravel, trace asphalt, dark brown, moist
5		5	S2	7-11-17-12 (28)	24/15				S1 - Bottom 11": Silty SAND (SM), fine to coarse, 5-10% fine subangullar gravel, olive grey, moist S2 - Sandy SILT (ML), nonplasti, 35-40% fine to coarse sand, 5-10% fine subangular graavel, olive grey, moist
		7	S3	8-8-8-9 (16)	24/24				S3 - Similar to S1 Bottom 11", 25-30% fines
		9	S4	10-8-15-18 (23)	24/8				S4 - Silty SAND with Gravel (SM), fine to coarse, 15-20% fines, 25-30% fine to coarse subangular gravel, trace of weathered rock, olive, moist
10		10	S5	10-13-17-23 (30)	24/24		Sand and Gravel		S5 - Silty Sand (SM), fine to medium, trace coarse, 20-25% fines, 5-10% fine subangular gravel, olive grey, moist
		12							
15		15	S6	9-14-16-20 (30)	24/24				S6 - Silty SAND (SM), fine to medium, 25-30% fines, 0-5% fine subangular gravel, olive grey, moist
		17							
20		20	S7	10-15-21-21 (36)	24/24	1			▽ REMARK 1: Split spoon indicated alternating wet/dry strata, possible groundwater table at a depth of 20 feet. ▼ S7 - Silty SAND with Gravel (SM), fine to coarse, 25-30% fines, 10-15% fine subangular gravel, olive grey, moist to wet
		22						22.0	Bottom of borehole at 22.0 feet. Bottom of borehole at 22.0 feet. OW installed at a depth of 22 feet.
25									

GENERAL NOTES:

PHOENIX
Environmental Laboratories, Inc.

Monday, August 19, 2024

Attn: Jon Puliafico
Coneco Engineers & Scientists, Inc.
4 First Street
Bridgewater, MA 02324

Project ID: 12962
SDG ID: GCR38233
Sample ID#s: CR38233 - CR38236

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Sincerely yours,

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B
NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
VT Lab Registration #VT11301

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Sample Id Cross Reference

August 19, 2024

SDG I.D.: GCR38233

Project ID: 12962

Client Id	Lab Id	Matrix
B-1	CR38233	SOIL
B-2	CR38234	SOIL
B-3	CR38235	SOIL
B-1,2,3	CR38236	SOIL

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

August 19, 2024

FOR: Attn: Jon Puliafico
Coneco Engineers & Scientists, Inc.
4 First Street
Bridgewater, MA 02324

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:		08/07/24	13:30
Location Code:	CONECO-BRIDWTRMA	Received by:	CP	08/09/24	16:45
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCR38233
Phoenix ID: CR38233

Project ID: 12962
Client ID: B-1

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Silver	< 0.34	0.34	mg/Kg	1	08/13/24	TH	SW6010D
Arsenic	52.2	0.67	mg/Kg	1	08/13/24	TH	SW6010D
Barium	57.5	0.34	mg/Kg	1	08/13/24	TH	SW6010D
Beryllium	0.61	0.27	mg/Kg	1	08/13/24	TH	SW6010D
Cadmium	< 0.34	0.34	mg/Kg	1	08/13/24	TH	SW6010D
Chromium	26.9	0.34	mg/Kg	1	08/13/24	TH	SW6010D
Mercury	< 0.03	0.03	mg/Kg	2	08/13/24	AL1	SW7471B
Nickel	26.0	0.34	mg/Kg	1	08/13/24	TH	SW6010D
Lead	10.4	0.34	mg/Kg	1	08/13/24	TH	SW6010D
Antimony	< 3.4	3.4	mg/Kg	1	08/13/24	TH	SW6010D
Selenium	< 1.3	1.3	mg/Kg	1	08/13/24	TH	SW6010D
Thallium	< 3.0	3.0	mg/Kg	1	08/13/24	TH	SW6010D
Vanadium	26.9	0.34	mg/Kg	1	08/13/24	TH	SW6010D
Zinc	39.2	0.7	mg/Kg	1	08/13/24	TH	SW6010D
Percent Solid	93		%		08/09/24	H	SW846-%Solid
Corrosivity	Negative		Pos/Neg	1	08/09/24	SH	SW846-Corr
Flash Point	>200	200	Degree F	1	08/14/24	G	SW1010B
Ignitability	Passed	140	degree F	1	08/14/24	G	SW846-Ignit
pH at 25C - Soil	6.50	1.00	pH Units	1	08/09/24 22:15	SH	SW846 9045D
Reactivity Cyanide	< 5	5	mg/Kg	1	08/12/24	NP/GD	SW846 7.3.3.1/90
Reactivity Sulfide	< 20	20	mg/Kg	1	08/12/24	NP/GD	SW846 CH7
Reactivity	Negative		Pos/Neg	1	08/12/24	NP/GD	SW846-React
Field Extraction	Completed				08/07/24		SW5035A
Mercury Digestion	Completed				08/12/24	AL/AL	SW7471B
Extraction of ETPH	Completed				08/14/24	GW/GW	SW3546
Soil Extraction for PCB	Completed				08/12/24	C/A	SW3546
Soil Extraction for SVOA	Completed				08/13/24	F/X	SW3546

Ver 1

Project ID: 12962
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Phoenix I.D.: CR38233

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Total Metals Digest	Completed				08/12/24	P/AG	SW3050B
Polychlorinated Biphenyls							
PCB-1016	ND	71	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1221	ND	71	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1232	ND	71	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1242	ND	71	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1248	ND	71	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1254	ND	71	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1260	ND	71	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1262	ND	71	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1268	ND	71	ug/Kg	2	08/13/24	SC	SW8082A
QA/QC Surrogates							
% DCBP	73		%	2	08/13/24	SC	30 - 150 %
% DCBP (Confirmation)	78		%	2	08/13/24	SC	30 - 150 %
% TCMX	73		%	2	08/13/24	SC	30 - 150 %
% TCMX (Confirmation)	75		%	2	08/13/24	SC	30 - 150 %
TPH by GC (Extractable (C9-C36))							
Fuel Oil #2 / Diesel Fuel	ND	53	mg/kg	1	08/15/24	KCA	SW8015D
Fuel Oil #4	ND	53	mg/kg	1	08/15/24	KCA	SW8015D
Fuel Oil #6	ND	53	mg/kg	1	08/15/24	KCA	SW8015D
Kerosene	ND	53	mg/kg	1	08/15/24	KCA	SW8015D
Motor Oil	ND	53	mg/kg	1	08/15/24	KCA	SW8015D
Total TPH	ND	53	mg/kg	1	08/15/24	KCA	SW8015D
Unidentified	ND	53	mg/kg	1	08/15/24	KCA	SW8015D
QA/QC Surrogates							
% COD (surr)	124		%	1	08/15/24	KCA	50 - 150 %
% Terphenyl (surr)	105		%	1	08/15/24	KCA	50 - 150 %
Volatiles							
1,1,1,2-Tetrachloroethane	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
1,1,1-Trichloroethane	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
1,1,2,2-Tetrachloroethane	ND	2.3	ug/Kg	1	08/10/24	JLI	SW8260D
1,1,2-Trichloroethane	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
1,1-Dichloroethane	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
1,1-Dichloroethene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
1,1-Dichloropropene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
1,2,3-Trichlorobenzene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
1,2,3-Trichloropropane	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
1,2,4-Trichlorobenzene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
1,2,4-Trimethylbenzene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
1,2-Dibromo-3-chloropropane	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
1,2-Dibromoethane	ND	0.38	ug/Kg	1	08/10/24	JLI	SW8260D
1,2-Dichlorobenzene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
1,2-Dichloroethane	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
1,2-Dichloropropane	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
1,3,5-Trimethylbenzene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
1,3-Dichlorobenzene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
1,3-Dichloropropane	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D

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Client ID: B-1

Phoenix I.D.: CR38233

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
1,4-Dichlorobenzene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
2,2-Dichloropropane	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
2-Chlorotoluene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
2-Hexanone	ND	19	ug/Kg	1	08/10/24	JLI	SW8260D
2-Isopropyltoluene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
4-Chlorotoluene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
4-Methyl-2-pentanone	ND	19	ug/Kg	1	08/10/24	JLI	SW8260D
Acetone	ND	190	ug/Kg	1	08/10/24	JLI	SW8260D
Acrylonitrile	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
Benzene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
Bromobenzene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
Bromochloromethane	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
Bromodichloromethane	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
Bromoform	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
Bromomethane	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
Carbon Disulfide	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
Carbon tetrachloride	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
Chlorobenzene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
Chloroethane	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
Chloroform	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
Chloromethane	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
cis-1,2-Dichloroethene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
cis-1,3-Dichloropropene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
Dibromochloromethane	ND	2.3	ug/Kg	1	08/10/24	JLI	SW8260D
Dibromomethane	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
Dichlorodifluoromethane	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
Ethylbenzene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
Hexachlorobutadiene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
Isopropylbenzene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
m&p-Xylene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
Methyl Ethyl Ketone	ND	23	ug/Kg	1	08/10/24	JLI	SW8260D
Methyl t-butyl ether (MTBE)	ND	7.5	ug/Kg	1	08/10/24	JLI	SW8260D
Methylene chloride	ND	7.5	ug/Kg	1	08/10/24	JLI	SW8260D
Naphthalene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
n-Butylbenzene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
n-Propylbenzene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
o-Xylene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
p-Isopropyltoluene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
sec-Butylbenzene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
Styrene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
tert-Butylbenzene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
Tetrachloroethene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
Tetrahydrofuran (THF)	ND	7.5	ug/Kg	1	08/10/24	JLI	SW8260D
Toluene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
Total Xylenes	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
trans-1,2-Dichloroethene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
trans-1,3-Dichloropropene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
trans-1,4-dichloro-2-butene	ND	7.5	ug/Kg	1	08/10/24	JLI	SW8260D
Trichloroethene	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D

Project ID: 12962
Client ID: B-1

Phoenix I.D.: CR38233

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Trichlorofluoromethane	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
Trichlorotrifluoroethane	ND	7.5	ug/Kg	1	08/10/24	JLI	SW8260D
Vinyl chloride	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D
QA/QC Surrogates							
% 1,2-dichlorobenzene-d4	101		%	1	08/10/24	JLI	70 - 130 %
% Bromofluorobenzene	94		%	1	08/10/24	JLI	70 - 130 %
% Dibromofluoromethane	107		%	1	08/10/24	JLI	70 - 130 %
% Toluene-d8	97		%	1	08/10/24	JLI	70 - 130 %
Oxygenates & Dioxane							
1,4-Dioxane	ND	75	ug/Kg	1	08/10/24	JLI	SW8260D (OXY)
Diethyl ether	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D (OXY)
Di-isopropyl ether	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D (OXY)
Ethyl tert-butyl ether	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D (OXY)
tert-amyl methyl ether	ND	3.8	ug/Kg	1	08/10/24	JLI	SW8260D (OXY)
Semivolatiles							
1,1-Biphenyl	ND	50	ug/Kg	1	08/14/24	MR	SW8270E
1,2,4,5-Tetrachlorobenzene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
1,2,4-Trichlorobenzene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
1,2-Dichlorobenzene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
1,2-Diphenylhydrazine	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
1,3-Dichlorobenzene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
1,4-Dichlorobenzene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2,2'-Oxybis(1-Chloropropane)	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2,4,5-Trichlorophenol	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2,4,6-Trichlorophenol	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2,4-Dichlorophenol	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2,4-Dimethylphenol	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2,4-Dinitrophenol	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
2,4-Dinitrotoluene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2,6-Dinitrotoluene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2-Chloronaphthalene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2-Chlorophenol	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2-Methylnaphthalene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2-Methylphenol (o-cresol)	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2-Nitroaniline	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
2-Nitrophenol	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
3&4-Methylphenol (m&p-cresol)	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
3,3'-Dichlorobenzidine	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
3-Nitroaniline	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
4,6-Dinitro-2-methylphenol	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
4-Bromophenyl phenyl ether	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
4-Chloro-3-methylphenol	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
4-Chloroaniline	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
4-Chlorophenyl phenyl ether	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
4-Nitroaniline	ND	570	ug/Kg	1	08/14/24	MR	SW8270E
4-Nitrophenol	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Acenaphthene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Acenaphthylene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E

Project ID: 12962
Client ID: B-1

Phoenix I.D.: CR38233

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Acetophenone	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Aniline	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Anthracene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Benz(a)anthracene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Benzidine	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Benzo(a)pyrene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Benzo(b)fluoranthene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Benzo(ghi)perylene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Benzo(k)fluoranthene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Benzoic acid	ND	710	ug/Kg	1	08/14/24	MR	SW8270E
Benzyl butyl phthalate	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Bis(2-chloroethoxy)methane	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Bis(2-chloroethyl)ether	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Bis(2-ethylhexyl)phthalate	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Carbazole	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Chrysene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Dibenz(a,h)anthracene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Dibenzofuran	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Diethyl phthalate	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Dimethylphthalate	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Di-n-butylphthalate	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Di-n-octylphthalate	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Fluoranthene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Fluorene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Hexachlorobenzene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Hexachlorobutadiene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Hexachlorocyclopentadiene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Hexachloroethane	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Indeno(1,2,3-cd)pyrene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Isophorone	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Naphthalene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Nitrobenzene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
N-Nitrosodimethylamine	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
N-Nitrosodi-n-propylamine	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
N-Nitrosodiphenylamine	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Pentachloronitrobenzene	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Pentachlorophenol	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Phenanthrene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Phenol	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Pyrene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Pyridine	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
QA/QC Surrogates							
% 2,4,6-Tribromophenol	63		%	1	08/14/24	MR	30 - 130 %
% 2-Fluorobiphenyl	52		%	1	08/14/24	MR	30 - 130 %
% 2-Fluorophenol	43		%	1	08/14/24	MR	30 - 130 %
% Nitrobenzene-d5	47		%	1	08/14/24	MR	30 - 130 %
% Phenol-d5	45		%	1	08/14/24	MR	30 - 130 %
% Terphenyl-d14	58		%	1	08/14/24	MR	30 - 130 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

Massachusetts does not offer certification for Soil/Solid matrices.

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Per 1.4.6 of EPA method 8270D, 1,2-Diphenylhydrazine is unstable and readily converts to Azobenzene. Azobenzene is used for the calibration of 1,2-Diphenylhydrazine.

Corrosivity is based solely on the pH analysis performed above.

Ignitability is based solely on the results of the closed cup flashpoint analysis performed above. Passed is >140 degree F.

The regulatory hold time for pH is immediately. This pH was performed in the laboratory and may be considered outside of hold-time.

The reactivity, reported above, is based only on the EPA Interim Guidance for Reactive Cyanide. This method is no longer listed in the current version of SW-846.

The reactivity, reported above, is based only on the EPA Interim Guidance for Reactive Sulfide. This method is no longer listed in the current version of SW-846.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.



Phyllis Shiller, Laboratory Director
August 19, 2024
Reviewed and Released by: Sarah Bell, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

August 19, 2024

FOR: Attn: Jon Puliafico
Coneco Engineers & Scientists, Inc.
4 First Street
Bridgewater, MA 02324

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:		08/07/24	13:30
Location Code:	CONECO-BRIDWTRMA	Received by:	CP	08/09/24	16:45
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCR38233
Phoenix ID: CR38234

Project ID: 12962
Client ID: B-2

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Silver	< 0.36	0.36	mg/Kg	1	08/13/24	TH	SW6010D
Arsenic	35.3	0.72	mg/Kg	1	08/13/24	TH	SW6010D
Barium	46.5	0.36	mg/Kg	1	08/13/24	TH	SW6010D
Beryllium	0.62	0.29	mg/Kg	1	08/13/24	TH	SW6010D
Cadmium	< 0.36	0.36	mg/Kg	1	08/13/24	TH	SW6010D
Chromium	33.3	0.36	mg/Kg	1	08/13/24	TH	SW6010D
Mercury	< 0.03	0.03	mg/Kg	2	08/13/24	AL1	SW7471B
Nickel	26.2	0.36	mg/Kg	1	08/13/24	TH	SW6010D
Lead	7.69	0.36	mg/Kg	1	08/13/24	TH	SW6010D
Antimony	< 3.6	3.6	mg/Kg	1	08/13/24	TH	SW6010D
Selenium	< 1.4	1.4	mg/Kg	1	08/13/24	TH	SW6010D
Thallium	< 3.2	3.2	mg/Kg	1	08/13/24	TH	SW6010D
Vanadium	25.4	0.36	mg/Kg	1	08/13/24	TH	SW6010D
Zinc	40.6	0.7	mg/Kg	1	08/13/24	TH	SW6010D
Percent Solid	90		%		08/09/24	H	SW846-%Solid
Corrosivity	Negative		Pos/Neg	1	08/09/24	SH	SW846-Corr
Flash Point	>200	200	Degree F	1	08/14/24	G	SW1010B
Ignitability	Passed	140	degree F	1	08/14/24	G	SW846-Ignit
pH at 25C - Soil	8.29	1.00	pH Units	1	08/09/24 22:15	SH	SW846 9045D
Reactivity Cyanide	< 5	5	mg/Kg	1	08/12/24	NP/GD	SW846 7.3.3.1/90
Reactivity Sulfide	< 20	20	mg/Kg	1	08/12/24	NP/GD	SW846 CH7
Reactivity	Negative		Pos/Neg	1	08/12/24	NP/GD	SW846-React
Field Extraction	Completed				08/07/24		SW5035A
Mercury Digestion	Completed				08/12/24	AL/AL	SW7471B
Extraction of ETPH	Completed				08/14/24	GW/GW	SW3546
Soil Extraction for PCB	Completed				08/12/24	C/A	SW3546
Soil Extraction for SVOA	Completed				08/13/24	F/X	SW3546

Ver 1

Project ID: 12962
Client ID: B-2

Phoenix I.D.: CR38234

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Total Metals Digest	Completed				08/12/24	P/AG	SW3050B
Polychlorinated Biphenyls							
PCB-1016	ND	73	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1221	ND	73	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1232	ND	73	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1242	ND	73	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1248	ND	73	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1254	ND	73	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1260	ND	73	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1262	ND	73	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1268	ND	73	ug/Kg	2	08/13/24	SC	SW8082A
QA/QC Surrogates							
% DCBP	72		%	2	08/13/24	SC	30 - 150 %
% DCBP (Confirmation)	85		%	2	08/13/24	SC	30 - 150 %
% TCMX	61		%	2	08/13/24	SC	30 - 150 %
% TCMX (Confirmation)	81		%	2	08/13/24	SC	30 - 150 %
TPH by GC (Extractable (C9-C36))							
Fuel Oil #2 / Diesel Fuel	ND	54	mg/kg	1	08/15/24	KCA	SW8015D
Fuel Oil #4	ND	54	mg/kg	1	08/15/24	KCA	SW8015D
Fuel Oil #6	ND	54	mg/kg	1	08/15/24	KCA	SW8015D
Kerosene	ND	54	mg/kg	1	08/15/24	KCA	SW8015D
Motor Oil	ND	54	mg/kg	1	08/15/24	KCA	SW8015D
Total TPH	ND	54	mg/kg	1	08/15/24	KCA	SW8015D
Unidentified	ND	54	mg/kg	1	08/15/24	KCA	SW8015D
QA/QC Surrogates							
% COD (surr)	106		%	1	08/15/24	KCA	50 - 150 %
% Terphenyl (surr)	93		%	1	08/15/24	KCA	50 - 150 %
Volatiles							
1,1,1,2-Tetrachloroethane	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
1,1,1-Trichloroethane	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
1,1,2,2-Tetrachloroethane	ND	3.0	ug/Kg	1	08/10/24	JLI	SW8260D
1,1,2-Trichloroethane	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
1,1-Dichloroethane	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
1,1-Dichloroethene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
1,1-Dichloropropene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
1,2,3-Trichlorobenzene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
1,2,3-Trichloropropane	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
1,2,4-Trichlorobenzene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
1,2,4-Trimethylbenzene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
1,2-Dibromo-3-chloropropane	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
1,2-Dibromoethane	ND	0.50	ug/Kg	1	08/10/24	JLI	SW8260D
1,2-Dichlorobenzene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
1,2-Dichloroethane	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
1,2-Dichloropropane	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
1,3,5-Trimethylbenzene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
1,3-Dichlorobenzene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
1,3-Dichloropropane	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D

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Phoenix I.D.: CR38234

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
1,4-Dichlorobenzene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
2,2-Dichloropropane	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
2-Chlorotoluene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
2-Hexanone	ND	25	ug/Kg	1	08/10/24	JLI	SW8260D
2-Isopropyltoluene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
4-Chlorotoluene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
4-Methyl-2-pentanone	ND	25	ug/Kg	1	08/10/24	JLI	SW8260D
Acetone	ND	250	ug/Kg	1	08/10/24	JLI	SW8260D
Acrylonitrile	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
Benzene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
Bromobenzene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
Bromochloromethane	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
Bromodichloromethane	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
Bromoform	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
Bromomethane	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
Carbon Disulfide	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
Carbon tetrachloride	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
Chlorobenzene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
Chloroethane	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
Chloroform	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
Chloromethane	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
cis-1,2-Dichloroethene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
cis-1,3-Dichloropropene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
Dibromochloromethane	ND	3.0	ug/Kg	1	08/10/24	JLI	SW8260D
Dibromomethane	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
Dichlorodifluoromethane	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
Ethylbenzene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
Hexachlorobutadiene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
Isopropylbenzene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
m&p-Xylene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
Methyl Ethyl Ketone	ND	30	ug/Kg	1	08/10/24	JLI	SW8260D
Methyl t-butyl ether (MTBE)	ND	10	ug/Kg	1	08/10/24	JLI	SW8260D
Methylene chloride	ND	10	ug/Kg	1	08/10/24	JLI	SW8260D
Naphthalene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
n-Butylbenzene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
n-Propylbenzene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
o-Xylene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
p-Isopropyltoluene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
sec-Butylbenzene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
Styrene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
tert-Butylbenzene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
Tetrachloroethene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
Tetrahydrofuran (THF)	ND	10	ug/Kg	1	08/10/24	JLI	SW8260D
Toluene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
Total Xylenes	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
trans-1,2-Dichloroethene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
trans-1,3-Dichloropropene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
trans-1,4-dichloro-2-butene	ND	10	ug/Kg	1	08/10/24	JLI	SW8260D
Trichloroethene	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D

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Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Trichlorofluoromethane	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
Trichlorotrifluoroethane	ND	10	ug/Kg	1	08/10/24	JLI	SW8260D
Vinyl chloride	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D
QA/QC Surrogates							
% 1,2-dichlorobenzene-d4	100		%	1	08/10/24	JLI	70 - 130 %
% Bromofluorobenzene	96		%	1	08/10/24	JLI	70 - 130 %
% Dibromofluoromethane	104		%	1	08/10/24	JLI	70 - 130 %
% Toluene-d8	99		%	1	08/10/24	JLI	70 - 130 %
Oxygenates & Dioxane							
1,4-Dioxane	ND	100	ug/Kg	1	08/10/24	JLI	SW8260D (OXY)
Diethyl ether	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D (OXY)
Di-isopropyl ether	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D (OXY)
Ethyl tert-butyl ether	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D (OXY)
tert-amyl methyl ether	ND	5.0	ug/Kg	1	08/10/24	JLI	SW8260D (OXY)
Semivolatiles							
1,1-Biphenyl	ND	50	ug/Kg	1	08/14/24	MR	SW8270E
1,2,4,5-Tetrachlorobenzene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
1,2,4-Trichlorobenzene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
1,2-Dichlorobenzene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
1,2-Diphenylhydrazine	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
1,3-Dichlorobenzene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
1,4-Dichlorobenzene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2,2'-Oxybis(1-Chloropropane)	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2,4,5-Trichlorophenol	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2,4,6-Trichlorophenol	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2,4-Dichlorophenol	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2,4-Dimethylphenol	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2,4-Dinitrophenol	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
2,4-Dinitrotoluene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2,6-Dinitrotoluene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2-Chloronaphthalene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2-Chlorophenol	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2-Methylnaphthalene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2-Methylphenol (o-cresol)	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2-Nitroaniline	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
2-Nitrophenol	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
3&4-Methylphenol (m&p-cresol)	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
3,3'-Dichlorobenzidine	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
3-Nitroaniline	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
4,6-Dinitro-2-methylphenol	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
4-Bromophenyl phenyl ether	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
4-Chloro-3-methylphenol	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
4-Chloroaniline	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
4-Chlorophenyl phenyl ether	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
4-Nitroaniline	ND	580	ug/Kg	1	08/14/24	MR	SW8270E
4-Nitrophenol	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Acenaphthene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Acenaphthylene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E

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Client ID: B-2

Phoenix I.D.: CR38234

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Acetophenone	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Aniline	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Anthracene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Benz(a)anthracene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Benzidine	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Benzo(a)pyrene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Benzo(b)fluoranthene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Benzo(ghi)perylene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Benzo(k)fluoranthene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Benzoic acid	ND	730	ug/Kg	1	08/14/24	MR	SW8270E
Benzyl butyl phthalate	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Bis(2-chloroethoxy)methane	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Bis(2-chloroethyl)ether	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Bis(2-ethylhexyl)phthalate	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Carbazole	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Chrysene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Dibenz(a,h)anthracene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Dibenzofuran	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Diethyl phthalate	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Dimethylphthalate	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Di-n-butylphthalate	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Di-n-octylphthalate	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Fluoranthene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Fluorene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Hexachlorobenzene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Hexachlorobutadiene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Hexachlorocyclopentadiene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Hexachloroethane	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Indeno(1,2,3-cd)pyrene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Isophorone	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Naphthalene	350	250	ug/Kg	1	08/14/24	MR	SW8270E
Nitrobenzene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
N-Nitrosodimethylamine	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
N-Nitrosodi-n-propylamine	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
N-Nitrosodiphenylamine	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Pentachloronitrobenzene	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Pentachlorophenol	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Phenanthrene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Phenol	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Pyrene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Pyridine	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
QA/QC Surrogates							
% 2,4,6-Tribromophenol	70		%	1	08/14/24	MR	30 - 130 %
% 2-Fluorobiphenyl	63		%	1	08/14/24	MR	30 - 130 %
% 2-Fluorophenol	57		%	1	08/14/24	MR	30 - 130 %
% Nitrobenzene-d5	63		%	1	08/14/24	MR	30 - 130 %
% Phenol-d5	57		%	1	08/14/24	MR	30 - 130 %
% Terphenyl-d14	63		%	1	08/14/24	MR	30 - 130 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

Massachusetts does not offer certification for Soil/Solid matrices.

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Per 1.4.6 of EPA method 8270D, 1,2-Diphenylhydrazine is unstable and readily converts to Azobenzene. Azobenzene is used for the calibration of 1,2-Diphenylhydrazine.

Corrosivity is based solely on the pH analysis performed above.

Ignitability is based solely on the results of the closed cup flashpoint analysis performed above. Passed is >140 degree F.

The regulatory hold time for pH is immediately. This pH was performed in the laboratory and may be considered outside of hold-time.

The reactivity, reported above, is based only on the EPA Interim Guidance for Reactive Cyanide. This method is no longer listed in the current version of SW-846.

The reactivity, reported above, is based only on the EPA Interim Guidance for Reactive Sulfide. This method is no longer listed in the current version of SW-846.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.



Phyllis Shiller, Laboratory Director
August 19, 2024
Reviewed and Released by: Sarah Bell, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

August 19, 2024

FOR: Attn: Jon Puliafico
Coneco Engineers & Scientists, Inc.
4 First Street
Bridgewater, MA 02324

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:		08/07/24	13:30
Location Code:	CONECO-BRIDWTRMA	Received by:	CP	08/09/24	16:45
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCR38233
Phoenix ID: CR38235

Project ID: 12962
Client ID: B-3

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Silver	< 0.34	0.34	mg/Kg	1	08/13/24	TH	SW6010D
Arsenic	33.3	0.69	mg/Kg	1	08/13/24	TH	SW6010D
Barium	77.6	0.34	mg/Kg	1	08/13/24	TH	SW6010D
Beryllium	0.71	0.27	mg/Kg	1	08/13/24	TH	SW6010D
Cadmium	< 0.34	0.34	mg/Kg	1	08/13/24	TH	SW6010D
Chromium	30.9	0.34	mg/Kg	1	08/13/24	TH	SW6010D
Mercury	< 0.03	0.03	mg/Kg	2	08/13/24	AL1	SW7471B
Nickel	30.9	0.34	mg/Kg	1	08/13/24	TH	SW6010D
Lead	7.37	0.34	mg/Kg	1	08/13/24	TH	SW6010D
Antimony	< 3.4	3.4	mg/Kg	1	08/13/24	TH	SW6010D
Selenium	< 1.4	1.4	mg/Kg	1	08/13/24	TH	SW6010D
Thallium	< 3.1	3.1	mg/Kg	1	08/13/24	TH	SW6010D
Vanadium	28.7	0.34	mg/Kg	1	08/13/24	TH	SW6010D
Zinc	47.2	0.7	mg/Kg	1	08/13/24	TH	SW6010D
Percent Solid	90		%		08/09/24	H	SW846-%Solid
Corrosivity	Negative		Pos/Neg	1	08/09/24	SH	SW846-Corr
Flash Point	>200	200	Degree F	1	08/14/24	G	SW1010B
Ignitability	Passed	140	degree F	1	08/14/24	G	SW846-Ignit
pH at 25C - Soil	7.33	1.00	pH Units	1	08/09/24 22:15	SH	SW846 9045D
Reactivity Cyanide	< 5	5	mg/Kg	1	08/12/24	NP/GD	SW846 7.3.3.1/90
Reactivity Sulfide	< 20	20	mg/Kg	1	08/12/24	NP/GD	SW846 CH7
Reactivity	Negative		Pos/Neg	1	08/12/24	NP/GD	SW846-React
Field Extraction	Completed				08/07/24		SW5035A
Mercury Digestion	Completed				08/12/24	AL/AL	SW7471B
Extraction of ETPH	Completed				08/14/24	GW/GW	SW3546
Soil Extraction for PCB	Completed				08/12/24	C/A	SW3546
Soil Extraction for SVOA	Completed				08/13/24	F/X	SW3546

Ver 1

Project ID: 12962
Client ID: B-3

Phoenix I.D.: CR38235

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Total Metals Digest	Completed				08/12/24	P/AG	SW3050B
Polychlorinated Biphenyls							
PCB-1016	ND	72	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1221	ND	72	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1232	ND	72	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1242	ND	72	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1248	ND	72	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1254	ND	72	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1260	ND	72	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1262	ND	72	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1268	ND	72	ug/Kg	2	08/13/24	SC	SW8082A
QA/QC Surrogates							
% DCBP	86		%	2	08/13/24	SC	30 - 150 %
% DCBP (Confirmation)	84		%	2	08/13/24	SC	30 - 150 %
% TCMX	70		%	2	08/13/24	SC	30 - 150 %
% TCMX (Confirmation)	73		%	2	08/13/24	SC	30 - 150 %
TPH by GC (Extractable (C9-C36))							
Fuel Oil #2 / Diesel Fuel	ND	54	mg/kg	1	08/15/24	KCA	SW8015D
Fuel Oil #4	ND	54	mg/kg	1	08/15/24	KCA	SW8015D
Fuel Oil #6	ND	54	mg/kg	1	08/15/24	KCA	SW8015D
Kerosene	ND	54	mg/kg	1	08/15/24	KCA	SW8015D
Motor Oil	ND	54	mg/kg	1	08/15/24	KCA	SW8015D
Total TPH	ND	54	mg/kg	1	08/15/24	KCA	SW8015D
Unidentified	ND	54	mg/kg	1	08/15/24	KCA	SW8015D
QA/QC Surrogates							
% COD (surr)	87		%	1	08/15/24	KCA	50 - 150 %
% Terphenyl (surr)	90		%	1	08/15/24	KCA	50 - 150 %
Volatiles							
1,1,1,2-Tetrachloroethane	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
1,1,1-Trichloroethane	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
1,1,2,2-Tetrachloroethane	ND	2.5	ug/Kg	1	08/10/24	JLI	SW8260D
1,1,2-Trichloroethane	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
1,1-Dichloroethane	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
1,1-Dichloroethene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
1,1-Dichloropropene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
1,2,3-Trichlorobenzene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
1,2,3-Trichloropropane	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
1,2,4-Trichlorobenzene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
1,2,4-Trimethylbenzene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
1,2-Dibromo-3-chloropropane	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
1,2-Dibromoethane	ND	0.42	ug/Kg	1	08/10/24	JLI	SW8260D
1,2-Dichlorobenzene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
1,2-Dichloroethane	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
1,2-Dichloropropane	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
1,3,5-Trimethylbenzene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
1,3-Dichlorobenzene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
1,3-Dichloropropane	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D

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Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
1,4-Dichlorobenzene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
2,2-Dichloropropane	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
2-Chlorotoluene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
2-Hexanone	ND	21	ug/Kg	1	08/10/24	JLI	SW8260D
2-Isopropyltoluene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
4-Chlorotoluene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
4-Methyl-2-pentanone	ND	21	ug/Kg	1	08/10/24	JLI	SW8260D
Acetone	ND	210	ug/Kg	1	08/10/24	JLI	SW8260D
Acrylonitrile	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
Benzene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
Bromobenzene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
Bromochloromethane	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
Bromodichloromethane	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
Bromoform	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
Bromomethane	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
Carbon Disulfide	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
Carbon tetrachloride	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
Chlorobenzene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
Chloroethane	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
Chloroform	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
Chloromethane	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
cis-1,2-Dichloroethene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
cis-1,3-Dichloropropene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
Dibromochloromethane	ND	2.5	ug/Kg	1	08/10/24	JLI	SW8260D
Dibromomethane	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
Dichlorodifluoromethane	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
Ethylbenzene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
Hexachlorobutadiene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
Isopropylbenzene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
m&p-Xylene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
Methyl Ethyl Ketone	ND	25	ug/Kg	1	08/10/24	JLI	SW8260D
Methyl t-butyl ether (MTBE)	ND	8.4	ug/Kg	1	08/10/24	JLI	SW8260D
Methylene chloride	ND	8.4	ug/Kg	1	08/10/24	JLI	SW8260D
Naphthalene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
n-Butylbenzene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
n-Propylbenzene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
o-Xylene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
p-Isopropyltoluene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
sec-Butylbenzene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
Styrene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
tert-Butylbenzene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
Tetrachloroethene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
Tetrahydrofuran (THF)	ND	8.4	ug/Kg	1	08/10/24	JLI	SW8260D
Toluene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
Total Xylenes	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
trans-1,2-Dichloroethene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
trans-1,3-Dichloropropene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
trans-1,4-dichloro-2-butene	ND	8.4	ug/Kg	1	08/10/24	JLI	SW8260D
Trichloroethene	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D

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Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Trichlorofluoromethane	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
Trichlorotrifluoroethane	ND	8.4	ug/Kg	1	08/10/24	JLI	SW8260D
Vinyl chloride	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D
QA/QC Surrogates							
% 1,2-dichlorobenzene-d4	100		%	1	08/10/24	JLI	70 - 130 %
% Bromofluorobenzene	86		%	1	08/10/24	JLI	70 - 130 %
% Dibromofluoromethane	109		%	1	08/10/24	JLI	70 - 130 %
% Toluene-d8	94		%	1	08/10/24	JLI	70 - 130 %
Oxygenates & Dioxane							
1,4-Dioxane	ND	84	ug/Kg	1	08/10/24	JLI	SW8260D (OXY)
Diethyl ether	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D (OXY)
Di-isopropyl ether	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D (OXY)
Ethyl tert-butyl ether	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D (OXY)
tert-amyl methyl ether	ND	4.2	ug/Kg	1	08/10/24	JLI	SW8260D (OXY)
Semivolatiles							
1,1-Biphenyl	ND	50	ug/Kg	1	08/14/24	MR	SW8270E
1,2,4,5-Tetrachlorobenzene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
1,2,4-Trichlorobenzene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
1,2-Dichlorobenzene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
1,2-Diphenylhydrazine	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
1,3-Dichlorobenzene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
1,4-Dichlorobenzene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2,2'-Oxybis(1-Chloropropane)	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2,4,5-Trichlorophenol	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2,4,6-Trichlorophenol	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2,4-Dichlorophenol	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2,4-Dimethylphenol	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2,4-Dinitrophenol	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
2,4-Dinitrotoluene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2,6-Dinitrotoluene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2-Chloronaphthalene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2-Chlorophenol	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2-Methylnaphthalene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2-Methylphenol (o-cresol)	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
2-Nitroaniline	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
2-Nitrophenol	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
3&4-Methylphenol (m&p-cresol)	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
3,3'-Dichlorobenzidine	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
3-Nitroaniline	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
4,6-Dinitro-2-methylphenol	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
4-Bromophenyl phenyl ether	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
4-Chloro-3-methylphenol	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
4-Chloroaniline	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
4-Chlorophenyl phenyl ether	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
4-Nitroaniline	ND	580	ug/Kg	1	08/14/24	MR	SW8270E
4-Nitrophenol	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Acenaphthene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Acenaphthylene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E

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Phoenix I.D.: CR38235

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Acetophenone	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Aniline	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Anthracene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Benz(a)anthracene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Benzidine	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Benzo(a)pyrene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Benzo(b)fluoranthene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Benzo(ghi)perylene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Benzo(k)fluoranthene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Benzoic acid	ND	720	ug/Kg	1	08/14/24	MR	SW8270E
Benzyl butyl phthalate	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Bis(2-chloroethoxy)methane	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Bis(2-chloroethyl)ether	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Bis(2-ethylhexyl)phthalate	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Carbazole	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Chrysene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Dibenz(a,h)anthracene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Dibenzofuran	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Diethyl phthalate	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Dimethylphthalate	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Di-n-butylphthalate	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Di-n-octylphthalate	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Fluoranthene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Fluorene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Hexachlorobenzene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Hexachlorobutadiene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Hexachlorocyclopentadiene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Hexachloroethane	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Indeno(1,2,3-cd)pyrene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Isophorone	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Naphthalene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Nitrobenzene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
N-Nitrosodimethylamine	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
N-Nitrosodi-n-propylamine	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
N-Nitrosodiphenylamine	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Pentachloronitrobenzene	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Pentachlorophenol	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Phenanthrene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Phenol	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Pyrene	ND	250	ug/Kg	1	08/14/24	MR	SW8270E
Pyridine	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
QA/QC Surrogates							
% 2,4,6-Tribromophenol	52		%	1	08/14/24	MR	30 - 130 %
% 2-Fluorobiphenyl	47		%	1	08/14/24	MR	30 - 130 %
% 2-Fluorophenol	42		%	1	08/14/24	MR	30 - 130 %
% Nitrobenzene-d5	47		%	1	08/14/24	MR	30 - 130 %
% Phenol-d5	42		%	1	08/14/24	MR	30 - 130 %
% Terphenyl-d14	47		%	1	08/14/24	MR	30 - 130 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

Massachusetts does not offer certification for Soil/Solid matrices.

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Per 1.4.6 of EPA method 8270D, 1,2-Diphenylhydrazine is unstable and readily converts to Azobenzene. Azobenzene is used for the calibration of 1,2-Diphenylhydrazine.

Corrosivity is based solely on the pH analysis performed above.

Ignitability is based solely on the results of the closed cup flashpoint analysis performed above. Passed is >140 degree F.

The regulatory hold time for pH is immediately. This pH was performed in the laboratory and may be considered outside of hold-time.

The reactivity, reported above, is based only on the EPA Interim Guidance for Reactive Cyanide. This method is no longer listed in the current version of SW-846.

The reactivity, reported above, is based only on the EPA Interim Guidance for Reactive Sulfide. This method is no longer listed in the current version of SW-846.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.



Phyllis Shiller, Laboratory Director
August 19, 2024
Reviewed and Released by: Sarah Bell, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

August 19, 2024

FOR: Attn: Jon Puliafico
Coneco Engineers & Scientists, Inc.
4 First Street
Bridgewater, MA 02324

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:		08/07/24	13:30
Location Code:	CONECO-BRIDWTRMA	Received by:	CP	08/09/24	16:45
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCR38233
Phoenix ID: CR38236

Project ID: 12962
Client ID: B-1,2,3

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Silver	< 0.33	0.33	mg/Kg	1	08/13/24	TH	SW6010D
Arsenic	29.9	0.66	mg/Kg	1	08/13/24	TH	SW6010D
Barium	31.2	0.33	mg/Kg	1	08/13/24	TH	SW6010D
Beryllium	0.33	0.26	mg/Kg	1	08/13/24	TH	SW6010D
Cadmium	< 0.33	0.33	mg/Kg	1	08/13/24	TH	SW6010D
Chromium	32.4	0.33	mg/Kg	1	08/13/24	TH	SW6010D
Mercury	< 0.03	0.03	mg/Kg	2	08/13/24	AL1	SW7471B
Nickel	33.1	0.33	mg/Kg	1	08/13/24	TH	SW6010D
Lead	6.99	0.33	mg/Kg	1	08/13/24	TH	SW6010D
Antimony	< 3.3	3.3	mg/Kg	1	08/13/24	TH	SW6010D
Selenium	< 1.3	1.3	mg/Kg	1	08/13/24	TH	SW6010D
Thallium	< 3.0	3.0	mg/Kg	1	08/13/24	TH	SW6010D
Vanadium	19.9	0.33	mg/Kg	1	08/13/24	TH	SW6010D
Zinc	44.2	0.7	mg/Kg	1	08/13/24	TH	SW6010D
Percent Solid	90		%		08/09/24	H	SW846-%Solid
Corrosivity	Negative		Pos/Neg	1	08/09/24	SH	SW846-Corr
Flash Point	>200	200	Degree F	1	08/14/24	G	SW1010B
Ignitability	Passed	140	degree F	1	08/14/24	G	SW846-Ignit
pH at 25C - Soil	7.33	1.00	pH Units	1	08/09/24 22:16	SH	SW846 9045D
Reactivity Cyanide	< 5	5	mg/Kg	1	08/12/24	NP/GD	SW846 7.3.3.1/90
Reactivity Sulfide	< 20	20	mg/Kg	1	08/12/24	NP/GD	SW846 CH7
Reactivity	Negative		Pos/Neg	1	08/12/24	NP/GD	SW846-React
Field Extraction	Completed				08/07/24		SW5035A
Mercury Digestion	Completed				08/12/24	AL/AL	SW7471B
Extraction of ETPH	Completed				08/14/24	GW/GW	SW3546
Soil Extraction for PCB	Completed				08/12/24	C/A	SW3546
Soil Extraction for SVOA	Completed				08/13/24	F/X	SW3546

Ver 1

Project ID: 12962
Client ID: B-1,2,3

Phoenix I.D.: CR38236

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Total Metals Digest	Completed				08/12/24	P/AG	SW3050B
Polychlorinated Biphenyls							
PCB-1016	ND	73	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1221	ND	73	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1232	ND	73	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1242	ND	73	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1248	ND	73	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1254	ND	73	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1260	ND	73	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1262	ND	73	ug/Kg	2	08/13/24	SC	SW8082A
PCB-1268	ND	73	ug/Kg	2	08/13/24	SC	SW8082A
QA/QC Surrogates							
% DCBP	84		%	2	08/13/24	SC	30 - 150 %
% DCBP (Confirmation)	90		%	2	08/13/24	SC	30 - 150 %
% TCMX	72		%	2	08/13/24	SC	30 - 150 %
% TCMX (Confirmation)	77		%	2	08/13/24	SC	30 - 150 %
TPH by GC (Extractable (C9-C36))							
Fuel Oil #2 / Diesel Fuel	ND	55	mg/kg	1	08/15/24	KCA	SW8015D
Fuel Oil #4	ND	55	mg/kg	1	08/15/24	KCA	SW8015D
Fuel Oil #6	ND	55	mg/kg	1	08/15/24	KCA	SW8015D
Kerosene	ND	55	mg/kg	1	08/15/24	KCA	SW8015D
Motor Oil	ND	55	mg/kg	1	08/15/24	KCA	SW8015D
Total TPH	ND	55	mg/kg	1	08/15/24	KCA	SW8015D
Unidentified	ND	55	mg/kg	1	08/15/24	KCA	SW8015D
QA/QC Surrogates							
% COD (surr)	73		%	1	08/15/24	KCA	50 - 150 %
% Terphenyl (surr)	78		%	1	08/15/24	KCA	50 - 150 %
Volatiles							
1,1,1,2-Tetrachloroethane	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
1,1,1-Trichloroethane	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
1,1,2,2-Tetrachloroethane	ND	2.8	ug/Kg	1	08/10/24	JLI	SW8260D
1,1,2-Trichloroethane	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
1,1-Dichloroethane	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
1,1-Dichloroethene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
1,1-Dichloropropene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
1,2,3-Trichlorobenzene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
1,2,3-Trichloropropane	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
1,2,4-Trichlorobenzene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
1,2,4-Trimethylbenzene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
1,2-Dibromo-3-chloropropane	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
1,2-Dibromoethane	ND	0.46	ug/Kg	1	08/10/24	JLI	SW8260D
1,2-Dichlorobenzene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
1,2-Dichloroethane	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
1,2-Dichloropropane	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
1,3,5-Trimethylbenzene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
1,3-Dichlorobenzene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
1,3-Dichloropropane	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D

Project ID: 12962
Client ID: B-1,2,3

Phoenix I.D.: CR38236

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
1,4-Dichlorobenzene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
2,2-Dichloropropane	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
2-Chlorotoluene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
2-Hexanone	ND	23	ug/Kg	1	08/10/24	JLI	SW8260D
2-Isopropyltoluene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
4-Chlorotoluene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
4-Methyl-2-pentanone	ND	23	ug/Kg	1	08/10/24	JLI	SW8260D
Acetone	ND	230	ug/Kg	1	08/10/24	JLI	SW8260D
Acrylonitrile	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
Benzene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
Bromobenzene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
Bromochloromethane	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
Bromodichloromethane	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
Bromoform	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
Bromomethane	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
Carbon Disulfide	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
Carbon tetrachloride	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
Chlorobenzene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
Chloroethane	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
Chloroform	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
Chloromethane	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
cis-1,2-Dichloroethene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
cis-1,3-Dichloropropene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
Dibromochloromethane	ND	2.8	ug/Kg	1	08/10/24	JLI	SW8260D
Dibromomethane	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
Dichlorodifluoromethane	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
Ethylbenzene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
Hexachlorobutadiene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
Isopropylbenzene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
m&p-Xylene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
Methyl Ethyl Ketone	ND	28	ug/Kg	1	08/10/24	JLI	SW8260D
Methyl t-butyl ether (MTBE)	ND	9.2	ug/Kg	1	08/10/24	JLI	SW8260D
Methylene chloride	ND	9.2	ug/Kg	1	08/10/24	JLI	SW8260D
Naphthalene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
n-Butylbenzene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
n-Propylbenzene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
o-Xylene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
p-Isopropyltoluene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
sec-Butylbenzene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
Styrene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
tert-Butylbenzene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
Tetrachloroethene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
Tetrahydrofuran (THF)	ND	9.2	ug/Kg	1	08/10/24	JLI	SW8260D
Toluene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
Total Xylenes	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
trans-1,2-Dichloroethene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
trans-1,3-Dichloropropene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
trans-1,4-dichloro-2-butene	ND	9.2	ug/Kg	1	08/10/24	JLI	SW8260D
Trichloroethene	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D

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Client ID: B-1,2,3

Phoenix I.D.: CR38236

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Trichlorofluoromethane	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
Trichlorotrifluoroethane	ND	9.2	ug/Kg	1	08/10/24	JLI	SW8260D
Vinyl chloride	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D
QA/QC Surrogates							
% 1,2-dichlorobenzene-d4	101		%	1	08/10/24	JLI	70 - 130 %
% Bromofluorobenzene	96		%	1	08/10/24	JLI	70 - 130 %
% Dibromofluoromethane	107		%	1	08/10/24	JLI	70 - 130 %
% Toluene-d8	97		%	1	08/10/24	JLI	70 - 130 %
Oxygenates & Dioxane							
1,4-Dioxane	ND	92	ug/Kg	1	08/10/24	JLI	SW8260D (OXY)
Diethyl ether	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D (OXY)
Di-isopropyl ether	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D (OXY)
Ethyl tert-butyl ether	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D (OXY)
tert-amyl methyl ether	ND	4.6	ug/Kg	1	08/10/24	JLI	SW8260D (OXY)
Semivolatiles							
1,1-Biphenyl	ND	50	ug/Kg	1	08/14/24	MR	SW8270E
1,2,4,5-Tetrachlorobenzene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
1,2,4-Trichlorobenzene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
1,2-Dichlorobenzene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
1,2-Diphenylhydrazine	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
1,3-Dichlorobenzene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
1,4-Dichlorobenzene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
2,2'-Oxybis(1-Chloropropane)	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
2,4,5-Trichlorophenol	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
2,4,6-Trichlorophenol	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
2,4-Dichlorophenol	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
2,4-Dimethylphenol	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
2,4-Dinitrophenol	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
2,4-Dinitrotoluene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
2,6-Dinitrotoluene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
2-Chloronaphthalene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
2-Chlorophenol	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
2-Methylnaphthalene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
2-Methylphenol (o-cresol)	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
2-Nitroaniline	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
2-Nitrophenol	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
3&4-Methylphenol (m&p-cresol)	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
3,3'-Dichlorobenzidine	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
3-Nitroaniline	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
4,6-Dinitro-2-methylphenol	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
4-Bromophenyl phenyl ether	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
4-Chloro-3-methylphenol	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
4-Chloroaniline	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
4-Chlorophenyl phenyl ether	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
4-Nitroaniline	ND	580	ug/Kg	1	08/14/24	MR	SW8270E
4-Nitrophenol	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Acenaphthene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Acenaphthylene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E

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Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Acetophenone	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Aniline	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Anthracene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Benz(a)anthracene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Benzidine	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Benzo(a)pyrene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Benzo(b)fluoranthene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Benzo(ghi)perylene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Benzo(k)fluoranthene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Benzoic acid	ND	730	ug/Kg	1	08/14/24	MR	SW8270E
Benzyl butyl phthalate	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Bis(2-chloroethoxy)methane	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Bis(2-chloroethyl)ether	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Bis(2-ethylhexyl)phthalate	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Carbazole	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Chrysene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Dibenz(a,h)anthracene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Dibenzofuran	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Diethyl phthalate	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Dimethylphthalate	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Di-n-butylphthalate	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Di-n-octylphthalate	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Fluoranthene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Fluorene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Hexachlorobenzene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Hexachlorobutadiene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Hexachlorocyclopentadiene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Hexachloroethane	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Indeno(1,2,3-cd)pyrene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Isophorone	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Naphthalene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Nitrobenzene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
N-Nitrosodimethylamine	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
N-Nitrosodi-n-propylamine	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
N-Nitrosodiphenylamine	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Pentachloronitrobenzene	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Pentachlorophenol	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
Phenanthrene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Phenol	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Pyrene	ND	260	ug/Kg	1	08/14/24	MR	SW8270E
Pyridine	ND	360	ug/Kg	1	08/14/24	MR	SW8270E
QA/QC Surrogates							
% 2,4,6-Tribromophenol	75		%	1	08/14/24	MR	30 - 130 %
% 2-Fluorobiphenyl	66		%	1	08/14/24	MR	30 - 130 %
% 2-Fluorophenol	57		%	1	08/14/24	MR	30 - 130 %
% Nitrobenzene-d5	61		%	1	08/14/24	MR	30 - 130 %
% Phenol-d5	58		%	1	08/14/24	MR	30 - 130 %
% Terphenyl-d14	70		%	1	08/14/24	MR	30 - 130 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

Massachusetts does not offer certification for Soil/Solid matrices.

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Per 1.4.6 of EPA method 8270D, 1,2-Diphenylhydrazine is unstable and readily converts to Azobenzene. Azobenzene is used for the calibration of 1,2-Diphenylhydrazine.

Corrosivity is based solely on the pH analysis performed above.

Ignitability is based solely on the results of the closed cup flashpoint analysis performed above. Passed is >140 degree F.

The regulatory hold time for pH is immediately. This pH was performed in the laboratory and may be considered outside of hold-time.

The reactivity, reported above, is based only on the EPA Interim Guidance for Reactive Cyanide. This method is no longer listed in the current version of SW-846.

The reactivity, reported above, is based only on the EPA Interim Guidance for Reactive Sulfide. This method is no longer listed in the current version of SW-846.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director
August 19, 2024
Reviewed and Released by: Sarah Bell, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

QA/QC Report

August 19, 2024

QA/QC Data

SDG I.D.: GCR38233

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 744359 (mg/kg), QC Sample No: CR38229 2X (CR38233, CR38234, CR38235, CR38236)													
Mercury - Soil	BRL	0.03	<0.03	<0.03	NC	117	116	0.9	103	98.7	4.3	75 - 125	20
Comment:													
Additional Mercury criteria: LCS acceptance range for waters is 80-120% and for soils is 75-125%													
QA/QC Batch 744481 (mg/kg), QC Sample No: CR38229 (CR38233, CR38234, CR38235, CR38236)													
ICP Metals - Soil													
Antimony	BRL	3.3	<3.6	<3.7	NC	91.1	91.6	0.5	84.0			75 - 125	35
Arsenic	BRL	0.67	27.8	31.7	13.1	105	101	3.9	98.0			75 - 125	35
Barium	BRL	0.33	101	117	14.7	107	97.1	9.7	97.6			75 - 125	35
Beryllium	BRL	0.27	0.35	0.40	NC	107	105	1.9	98.1			75 - 125	35
Cadmium	BRL	0.33	<0.36	<0.37	NC	111	108	2.7	93.8			75 - 125	35
Chromium	BRL	0.33	64.2	77.0	18.1	109	107	1.9	103			75 - 125	35
Lead	BRL	0.33	15.4	16.1	4.40	109	104	4.7	99.8			75 - 125	35
Nickel	BRL	0.33	29.3	31.6	7.60	111	108	2.7	97.5			75 - 125	35
Selenium	BRL	1.3	<1.4	<1.5	NC	92.5	89.8	3.0	81.1			75 - 125	35
Silver	BRL	0.33	<0.36	<0.37	NC	108	104	3.8	98.7			75 - 125	35
Thallium	BRL	3.0	<3.3	<3.4	NC	108	103	4.7	93.9			75 - 125	35
Vanadium	BRL	0.33	36.7	41.0	11.1	112	109	2.7	100			75 - 125	35
Zinc	BRL	0.67	38.0	45.0	16.9	105	102	2.9	100			75 - 125	35
Comment:													
Additional: LCS acceptance range is 80-120% MS acceptance range 75-125%.													

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

QA/QC Report

August 19, 2024

QA/QC Data

SDG I.D.: GCR38233

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 744373 (mg/Kg), QC Sample No: CR37641 5X (CR38233, CR38234, CR38235, CR38236)													
Reactivity Cyanide	BRL	5	<6	<5.6	NC	97.6						80 - 120	20
Reactivity Sulfide	BRL	20	<20	<20	NC	92.0						80 - 120	20
Comment:													
Additional: MS acceptance range is 90-110% for Aqueous and 75-125% for soils													
QA/QC Batch 744792 (Degree F), QC Sample No: CR32941 (CR38233, CR38234, CR38235, CR38236)													
Flash Point			>200	>200	NC	101						75 - 125	30
Comment:													
Additional: LCS acceptance range is 85-115% MS acceptance range 75-125%.													
QA/QC Batch 744289 (PH), QC Sample No: CR32941 (CR38233)													
pH			6.55	6.54	0.20	85.3						85 - 115	20
Comment:													
Additional: LCS acceptance range is 85-115% MS acceptance range 75-125%.													
QA/QC Batch 744291 (PH), QC Sample No: CR38234 (CR38234, CR38235, CR38236)													
pH			8.29	8.28	0.10	85.3						85 - 115	20
Comment:													
Additional: LCS acceptance range is 85-115% MS acceptance range 75-125%.													

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QA/QC Report

August 19, 2024

QA/QC Data

SDG I.D.: GCR38233

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits	
QA/QC Batch 744745 (mg/Kg), QC Sample No: CR38485 (CR38233, CR38234, CR38235, CR38236)											
TPH by GC (Extractable Products) - Soil											
Total TPH	ND	50	106	83	24.3	104	102	1.9	50 - 150	30	
% COD (surr)	78	%	148	127	15.3	151	142	6.1	50 - 150	30	m
% Terphenyl (surr)	93	%	112	81	32.1	95	92	3.2	50 - 150	30	r
Comment:											
The ETPH/DRO LCS has been normalized based on the alkane calibration.											
QA/QC Batch 744485 (ug/Kg), QC Sample No: CR38555 2X (CR38233, CR38234, CR38235, CR38236)											
Polychlorinated Biphenyls - Soil											
PCB-1016	ND	33	108	99	8.7	94	93	1.1	40 - 140	30	
PCB-1221	ND	33							40 - 140	30	
PCB-1232	ND	33							40 - 140	30	
PCB-1242	ND	33							40 - 140	30	
PCB-1248	ND	33							40 - 140	30	
PCB-1254	ND	33							40 - 140	30	
PCB-1260	ND	33	92	100	8.3	95	94	1.1	40 - 140	30	
PCB-1262	ND	33							40 - 140	30	
PCB-1268	ND	33							40 - 140	30	
% DCBP (Surrogate Rec)	93	%	106	103	2.9	96	94	2.1	30 - 150	30	
% DCBP (Surrogate Rec) (Confirm	91	%	100	103	3.0	95	93	2.1	30 - 150	30	
% TCMX (Surrogate Rec)	77	%	94	96	2.1	92	91	1.1	30 - 150	30	
% TCMX (Surrogate Rec) (Confirm	75	%	91	96	5.3	91	90	1.1	30 - 150	30	
QA/QC Batch 744643 (ug/kg), QC Sample No: CR37228 (CR38233, CR38234, CR38235, CR38236)											
Semivolatiles - Soil											
1,1-Biphenyl	ND	230	53	50	5.8	51	47	8.2	40 - 140	30	
1,2,4,5-Tetrachlorobenzene	ND	230	54	51	5.7	50	48	4.1	40 - 140	30	
1,2,4-Trichlorobenzene	ND	230	54	47	13.9	52	50	3.9	40 - 140	30	
1,2-Dichlorobenzene	ND	180	48	44	8.7	50	47	6.2	40 - 140	30	
1,2-Diphenylhydrazine	ND	230	57	57	0.0	54	50	7.7	40 - 140	30	
1,3-Dichlorobenzene	ND	230	44	41	7.1	48	45	6.5	40 - 140	30	
1,4-Dichlorobenzene	ND	230	46	43	6.7	49	47	4.2	40 - 140	30	
2,2'-Oxybis(1-Chloropropane)	ND	230	43	41	4.8	45	42	6.9	40 - 140	30	
2,4,5-Trichlorophenol	ND	230	62	59	5.0	55	52	5.6	30 - 130	30	
2,4,6-Trichlorophenol	ND	130	64	62	3.2	59	55	7.0	30 - 130	30	
2,4-Dichlorophenol	ND	130	65	61	6.3	60	55	8.7	30 - 130	30	
2,4-Dimethylphenol	ND	230	70	67	4.4	71	66	7.3	30 - 130	30	
2,4-Dinitrophenol	ND	230	44	49	10.8	39	25	43.8	30 - 130	30	m,r
2,4-Dinitrotoluene	ND	130	67	67	0.0	61	56	8.5	40 - 140	30	
2,6-Dinitrotoluene	ND	130	65	64	1.6	61	55	10.3	40 - 140	30	
2-Chloronaphthalene	ND	230	58	54	7.1	56	52	7.4	40 - 140	30	
2-Chlorophenol	ND	230	61	56	8.5	60	56	6.9	30 - 130	30	
2-Methylnaphthalene	ND	230	59	55	7.0	56	52	7.4	40 - 140	30	

QA/QC Data

SDG I.D.: GCR38233

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits	
2-Methylphenol (o-cresol)	ND	230	62	59	5.0	61	57	6.8	30 - 130	30	
2-Nitroaniline	ND	330	102	99	3.0	93	88	5.5	40 - 140	30	
2-Nitrophenol	ND	230	68	63	7.6	67	62	7.8	30 - 130	30	
3&4-Methylphenol (m&p-cresol)	ND	230	56	55	1.8	53	50	5.8	30 - 130	30	
3,3'-Dichlorobenzidine	ND	130	82	76	7.6	70	63	10.5	40 - 140	30	
3-Nitroaniline	ND	330	72	71	1.4	66	61	7.9	40 - 140	30	
4,6-Dinitro-2-methylphenol	ND	230	62	67	7.8	51	37	31.8	30 - 130	30	r
4-Bromophenyl phenyl ether	ND	230	61	57	6.8	53	50	5.8	40 - 140	30	
4-Chloro-3-methylphenol	ND	230	69	67	2.9	64	59	8.1	30 - 130	30	
4-Chloroaniline	ND	230	73	68	7.1	65	63	3.1	40 - 140	30	
4-Chlorophenyl phenyl ether	ND	230	63	61	3.2	57	53	7.3	40 - 140	30	
4-Nitroaniline	ND	230	66	65	1.5	63	59	6.6	40 - 140	30	
4-Nitrophenol	ND	230	66	67	1.5	66	63	4.7	30 - 130	30	
Acenaphthene	ND	230	59	57	3.4	55	52	5.6	40 - 140	30	
Acenaphthylene	ND	130	52	50	3.9	50	46	8.3	40 - 140	30	
Acetophenone	ND	230	54	50	7.7	54	50	7.7	40 - 140	30	
Aniline	ND	330	57	54	5.4	54	50	7.7	40 - 140	30	
Anthracene	ND	230	61	57	6.8	54	51	5.7	40 - 140	30	
Benz(a)anthracene	ND	230	62	60	3.3	58	54	7.1	40 - 140	30	
Benzidine	ND	330	74	73	1.4	65	58	11.4	40 - 140	30	
Benzo(a)pyrene	ND	130	63	61	3.2	57	53	7.3	40 - 140	30	
Benzo(b)fluoranthene	ND	160	61	58	5.0	57	54	5.4	40 - 140	30	
Benzo(ghi)perylene	ND	230	63	60	4.9	45	40	11.8	40 - 140	30	
Benzo(k)fluoranthene	ND	230	60	58	3.4	54	50	7.7	40 - 140	30	
Benzoic Acid	ND	670	56	68	19.4	56	46	19.6	30 - 130	30	
Benzyl butyl phthalate	ND	230	65	61	6.3	63	59	6.6	40 - 140	30	
Bis(2-chloroethoxy)methane	ND	230	59	56	5.2	58	55	5.3	40 - 140	30	
Bis(2-chloroethyl)ether	ND	130	54	50	7.7	54	51	5.7	40 - 140	30	
Bis(2-ethylhexyl)phthalate	ND	230	62	60	3.3	60	54	10.5	40 - 140	30	
Carbazole	ND	230	64	61	4.8	58	54	7.1	40 - 140	30	
Chrysene	ND	230	60	56	6.9	52	48	8.0	40 - 140	30	
Dibenz(a,h)anthracene	ND	130	64	61	4.8	49	43	13.0	40 - 140	30	
Dibenzofuran	ND	230	60	58	3.4	56	51	9.3	40 - 140	30	
Diethyl phthalate	ND	230	68	67	1.5	63	59	6.6	40 - 140	30	
Dimethylphthalate	ND	230	68	67	1.5	65	59	9.7	40 - 140	30	
Di-n-butylphthalate	ND	670	67	64	4.6	67	56	17.9	40 - 140	30	
Di-n-octylphthalate	ND	230	61	60	1.7	58	53	9.0	40 - 140	30	
Fluoranthene	ND	230	64	62	3.2	59	56	5.2	40 - 140	30	
Fluorene	ND	230	63	61	3.2	58	54	7.1	40 - 140	30	
Hexachlorobenzene	ND	130	65	60	8.0	52	50	3.9	40 - 140	30	
Hexachlorobutadiene	ND	230	56	50	11.3	56	54	3.6	40 - 140	30	
Hexachlorocyclopentadiene	ND	230	14	14	0.0	13	10	26.1	40 - 140	30	l,m
Hexachloroethane	ND	130	47	43	8.9	51	49	4.0	40 - 140	30	
Indeno(1,2,3-cd)pyrene	ND	230	57	55	3.6	44	39	12.0	40 - 140	30	m
Isophorone	ND	130	55	52	5.6	54	50	7.7	40 - 140	30	
Naphthalene	ND	230	57	54	5.4	54	46	16.0	40 - 140	30	
Nitrobenzene	ND	130	55	52	5.6	57	53	7.3	40 - 140	30	
N-Nitrosodimethylamine	ND	230	57	54	5.4	49	45	8.5	40 - 140	30	
N-Nitrosodi-n-propylamine	ND	130	60	56	6.9	58	56	3.5	40 - 140	30	
N-Nitrosodiphenylamine	ND	130	64	62	3.2	58	54	7.1	40 - 140	30	
Pentachloronitrobenzene	ND	230	65	61	6.3	58	53	9.0	40 - 140	30	
Pentachlorophenol	ND	230	58	56	3.5	51	45	12.5	30 - 130	30	
Phenanthrene	ND	130	60	57	5.1	55	51	7.5	40 - 140	30	

QA/QC Data

SDG I.D.: GCR38233

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits	
Phenol	ND	230	67	65	3.0	62	60	3.3	30 - 130	30	
Pyrene	ND	230	63	61	3.2	58	54	7.1	40 - 140	30	
Pyridine	ND	230	43	38	12.3	39	37	5.3	40 - 140	30	l,m
% 2,4,6-Tribromophenol	70	%	57	56	1.8	54	51	5.7	30 - 130	30	
% 2-Fluorobiphenyl	66	%	55	53	3.7	53	51	3.8	30 - 130	30	
% 2-Fluorophenol	62	%	53	50	5.8	52	50	3.9	30 - 130	30	
% Nitrobenzene-d5	67	%	55	52	5.6	57	53	7.3	30 - 130	30	
% Phenol-d5	63	%	55	55	0.0	53	49	7.8	30 - 130	30	
% Terphenyl-d14	78	%	62	62	0.0	56	52	7.4	30 - 130	30	

Comment:

Additional 8270 criteria: 10% of compounds can be outside of acceptance criteria as long as recovery is at least 10%. (Acid surrogates acceptance range for aqueous samples: 10-110%, for soils 30-130%)

QA/QC Batch 744577 (ug/kg), QC Sample No: CR37672 (CR38233, CR38234, CR38235, CR38236)

Volatiles - Soil (Low Level)

1,1,1,2-Tetrachloroethane	ND	5.0	97	100	3.0	90			70 - 130	20	
1,1,1-Trichloroethane	ND	5.0	99	100	1.0	94			70 - 130	20	
1,1,2,2-Tetrachloroethane	ND	3.0	84	87	3.5	97			70 - 130	20	
1,1,2-Trichloroethane	ND	5.0	94	101	7.2	91			70 - 130	20	
1,1-Dichloroethane	ND	5.0	97	98	1.0	94			70 - 130	20	
1,1-Dichloroethene	ND	5.0	97	97	0.0	92			70 - 130	20	
1,1-Dichloropropene	ND	5.0	100	99	1.0	90			70 - 130	20	
1,2,3-Trichlorobenzene	ND	5.0	97	99	2.0	51			70 - 130	20	m
1,2,3-Trichloropropane	ND	5.0	91	97	6.4	92			70 - 130	20	
1,2,4-Trichlorobenzene	ND	5.0	99	99	0.0	57			70 - 130	20	m
1,2,4-Trimethylbenzene	ND	1.0	97	97	0.0	73			70 - 130	20	
1,2-Dibromo-3-chloropropane	ND	5.0	96	110	13.6	88			70 - 130	20	
1,2-Dibromoethane	ND	5.0	97	102	5.0	92			70 - 130	20	
1,2-Dichlorobenzene	ND	5.0	95	95	0.0	77			70 - 130	20	
1,2-Dichloroethane	ND	5.0	92	96	4.3	86			70 - 130	20	
1,2-Dichloropropane	ND	5.0	97	100	3.0	94			70 - 130	20	
1,3,5-Trimethylbenzene	ND	1.0	100	100	0.0	80			70 - 130	20	
1,3-Dichlorobenzene	ND	5.0	95	94	1.1	78			70 - 130	20	
1,3-Dichloropropane	ND	5.0	97	100	3.0	92			70 - 130	20	
1,4-Dichlorobenzene	ND	5.0	94	94	0.0	78			70 - 130	20	
1,4-dioxane	ND	100	87	99	12.9	97			40 - 160	20	
2,2-Dichloropropane	ND	5.0	102	102	0.0	92			70 - 130	20	
2-Chlorotoluene	ND	5.0	101	101	0.0	90			70 - 130	20	
2-Hexanone	ND	25	90	101	11.5	62			40 - 160	20	
2-Isopropyltoluene	ND	5.0	102	102	0.0	80			70 - 130	20	
4-Chlorotoluene	ND	5.0	95	95	0.0	83			70 - 130	20	
4-Methyl-2-pentanone	ND	25	96	107	10.8	86			40 - 160	20	
Acetone	ND	10	79	85	7.3	64			40 - 160	20	
Acrylonitrile	ND	5.0	94	102	8.2	83			70 - 130	20	
Benzene	ND	1.0	94	95	1.1	91			70 - 130	20	
Bromobenzene	ND	5.0	99	98	1.0	91			70 - 130	20	
Bromochloromethane	ND	5.0	94	98	4.2	94			70 - 130	20	
Bromodichloromethane	ND	5.0	97	101	4.0	91			70 - 130	20	
Bromoform	ND	5.0	98	106	7.8	87			70 - 130	20	
Bromomethane	ND	5.0	102	101	1.0	90			40 - 160	20	
Carbon Disulfide	ND	5.0	104	103	1.0	93			70 - 130	20	
Carbon tetrachloride	ND	5.0	100	98	2.0	88			70 - 130	20	
Chlorobenzene	ND	5.0	96	95	1.0	86			70 - 130	20	

QA/QC Data

SDG I.D.: GCR38233

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits	
Chloroethane	ND	5.0	106	101	4.8	100			70 - 130	20	
Chloroform	ND	5.0	94	99	5.2	93			70 - 130	20	
Chloromethane	ND	5.0	115	114	0.9	108			40 - 160	20	
cis-1,2-Dichloroethene	ND	5.0	96	98	2.1	97			70 - 130	20	
cis-1,3-Dichloropropene	ND	5.0	101	105	3.9	93			70 - 130	20	
Dibromochloromethane	ND	3.0	101	104	2.9	90			70 - 130	20	
Dibromomethane	ND	5.0	96	101	5.1	93			70 - 130	20	
Dichlorodifluoromethane	ND	5.0	113	110	2.7	100			40 - 160	20	
Diethyl ether	ND	5.0	96	101	5.1	91			70 - 130	20	
Di-isopropyl ether	ND	5.0	100	103	3.0	98			70 - 130	20	
Ethyl tert-butyl ether	ND	5.0	101	106	4.8	100			70 - 130	20	
Ethylbenzene	ND	1.0	95	94	1.1	84			70 - 130	20	
Hexachlorobutadiene	ND	5.0	97	98	1.0	48			70 - 130	20	m
Isopropylbenzene	ND	1.0	104	103	1.0	93			70 - 130	20	
m&p-Xylene	ND	2.0	95	93	2.1	81			70 - 130	20	
Methyl ethyl ketone	ND	5.0	80	93	15.0	70			40 - 160	20	
Methyl t-butyl ether (MTBE)	ND	1.0	93	98	5.2	91			70 - 130	20	
Methylene chloride	ND	5.0	89	90	1.1	88			70 - 130	20	
Naphthalene	ND	5.0	100	108	7.7	39			70 - 130	20	m
n-Butylbenzene	ND	1.0	99	99	0.0	71			70 - 130	20	
n-Propylbenzene	ND	1.0	98	97	1.0	84			70 - 130	20	
o-Xylene	ND	2.0	97	96	1.0	86			70 - 130	20	
p-Isopropyltoluene	ND	1.0	101	102	1.0	78			70 - 130	20	
sec-Butylbenzene	ND	1.0	100	99	1.0	78			70 - 130	20	
Styrene	ND	5.0	100	99	1.0	85			70 - 130	20	
tert-amyl methyl ether	ND	5.0	97	104	7.0	97			70 - 130	20	
tert-Butylbenzene	ND	1.0	101	101	0.0	84			70 - 130	20	
Tetrachloroethene	ND	5.0	99	99	0.0	84			70 - 130	20	
Tetrahydrofuran (THF)	ND	5.0	91	103	12.4	89			70 - 130	20	
Toluene	ND	1.0	95	95	0.0	88			70 - 130	20	
trans-1,2-Dichloroethene	ND	5.0	97	97	0.0	93			70 - 130	20	
trans-1,3-Dichloropropene	ND	5.0	102	107	4.8	92			70 - 130	20	
trans-1,4-dichloro-2-butene	ND	5.0	101	110	8.5	91			70 - 130	20	
Trichloroethene	ND	5.0	107	109	1.9	89			70 - 130	20	
Trichlorofluoromethane	ND	5.0	96	94	2.1	85			70 - 130	20	
Trichlorotrifluoroethane	ND	5.0	97	99	2.0	88			70 - 130	20	
Vinyl chloride	ND	5.0	106	103	2.9	99			70 - 130	20	
% 1,2-dichlorobenzene-d4	99	%	101	101	0.0	100			70 - 130	20	
% Bromofluorobenzene	97	%	98	99	1.0	96			70 - 130	20	
% Dibromofluoromethane	101	%	102	101	1.0	100			70 - 130	20	
% Toluene-d8	99	%	100	102	2.0	101			70 - 130	20	

Comment:

The MSD is not reported for this LL soil batch.

Additional 8260 criteria: 10% of compounds can be outside of acceptance criteria as long as recovery is 10%.
The RPD criteria for the LCS/LCSD is 20%,
The MS/MSD RPD criteria is listed above.

l = This parameter is outside laboratory LCS/LCSD specified recovery limits.
m = This parameter is outside laboratory MS/MSD specified recovery limits.
r = This parameter is outside laboratory RPD specified recovery limits.

QA/QC Data

SDG I.D.: GCR38233

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference
LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample Duplicate
MS - Matrix Spike
MS Dup - Matrix Spike Duplicate
NC - No Criteria
Intf - Interference

Phyllis Shiller, Laboratory Director
August 19, 2024

Monday, August 19, 2024

Criteria: MA: S1

State: MA

Sample Criteria Exceedances Report

GCR38233 - CONECO-BRIDWTRMA

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units
CR38233	AS-SM	Arsenic	MA / CMR 310.40.1600 / S1 (mg/kg)	52.2	0.67	20	20	mg/Kg
CR38233	AS-SM	Arsenic	MA / SOIL S-1 STANDARDS / S-1 Soil & GW-1	52.2	0.67	20	20	mg/Kg
CR38234	AS-SM	Arsenic	MA / CMR 310.40.1600 / S1 (mg/kg)	35.3	0.72	20	20	mg/Kg
CR38234	AS-SM	Arsenic	MA / SOIL S-1 STANDARDS / S-1 Soil & GW-1	35.3	0.72	20	20	mg/Kg
CR38235	AS-SM	Arsenic	MA / CMR 310.40.1600 / S1 (mg/kg)	33.3	0.69	20	20	mg/Kg
CR38235	AS-SM	Arsenic	MA / SOIL S-1 STANDARDS / S-1 Soil & GW-1	33.3	0.69	20	20	mg/Kg
CR38236	AS-SM	Arsenic	MA / CMR 310.40.1600 / S1 (mg/kg)	29.9	0.66	20	20	mg/Kg
CR38236	AS-SM	Arsenic	MA / SOIL S-1 STANDARDS / S-1 Soil & GW-1	29.9	0.66	20	20	mg/Kg

Phoenix Laboratories does not assume responsibility for the data contained in this exceedance report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

NY # 11301

Analysis Comments

August 19, 2024 SDG I.D.: GCR38233

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report:

SVOA Narration

CHEM28 08/13/24-2: CR38233, CR38234, CR38235, CR38236

For 8270 full list, the DDT breakdown and pentachlorophenol & benzidine peak tailing were evaluated in the DFTPP tune and were found to be in control.
For 8270 BN list, benzidine peak tailing was evaluated in the DFTPP tune and was found to be in control.

The following Initial Calibration compounds did not meet recommended response factors: Hexachlorobenzene 0.072 (0.1)
The following Initial Calibration compounds did not meet minimum response factors: None.

The following Continuing Calibration compounds did not meet recommended response factors: Hexachlorobenzene 0.075 (0.1)
The following Continuing Calibration compounds did not meet minimum response factors: None.

Up to eight compounds can be outside of ICAL %RSD criteria and up to sixteen compounds can be outside of CCAL %Dev criteria if less than 40%.

VOA Narration

CHEM26 08/09/24-2: CR38233, CR38234, CR38235, CR38236

The following Initial Calibration compounds did not meet RSD% criteria: Acetone 25% (20%)
The following Initial Calibration compounds did not meet maximum RSD% criteria: None.

Up to eight compounds can be outside of ICAL %RSD criteria and up to sixteen compounds can be outside of CCAL %Dev criteria if less than 40%.

Cooler: Yes ☒ No ☐
Coolant: IPK ☒ ICE ☐ No ☐

PHOENIX
Environmental Laboratories, Inc.

CT/MA/RI CHAIN OF CUSTODY RECORD

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Email: makrina@phoenixlabs.com Fax (860) 645-0823
Client Services (860) 645-1102

Temp 1.4 °C Pg of

Data Delivery/Contact Options:
☐ Fax:
☐ Phone:
☒ Email: JPulitico@Coneco.com

Customer: Coneco
Address: 4 First St Bridgewater MA.

Project: L12462
Report to: Jon Pulitico
Invoice to:
Quote #

Project P.O:

This section MUST be completed with Bottle Quantities.

Client Sample - Information - Identification

Sampler's Signature: PGTille Date: 8/8/24

Matrix Code:
DW=Drinking Water **GW**=Ground Water **SW**=Surface Water **WW**=Waste Water
RW=Raw Water **SE**=Sediment **SL**=Sludge **S**=Soil **SD**=Solid **W**=Wipe **OIL**=Oil
B=Bulk **L**=Liquid **X** = _____(Other)

PHOENIX USE ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled	*MS/MSD (May be billable at analysis unit rate)	COMM 97 +	MCP 14 Metals	HW2 WASTE (Ignitc	GL Amber 8 oz. [ ] w/H3PO4 [ ] NAHSO4	Soil VOA Vials [ ] methanol [ ] DI H2O	GL Soil container ( ) oz	GL Soil container ( ) oz	40 ml VOA Vial [ ] As is [ ] HCl	GL Amber 1000ml [ ] As is [ ] H2SO4	PL As is [ ] 250ml [ ] 500ml [ ] 1000ml	PL H2SO4 [ ] 250ml [ ] 500ml [ ] 1000ml	PL HNO3 250ml	PL NaOH 250ml	Bacteria Bottle w/thio	Bacteria Bottle as is
38233	B-1	S	8/7	1:30	X	X	X					3	1							
38234	B-2	S	"	"	X	X	X					3	1							
38235	B-3	S	"	"	X	X	X					3	1							
38236	B-1,2,3	S	"	"	X	X	X					3	1							

Relinquished by:	Accepted by:	Date:	Time:
PGTille		8/9/24	1130
	Ashley Lee	8/9/24	16:46

Comments, Special Requirements or Regulations:

* PID < 0.1 ppm
* DO TCLP if indicated

Turnaround Time:
☐ 1 Day* ☑ Standard
☐ 2 Days* ☐ Other
☐ 3 Days*
☐ 4 Days*
☐ 5 Days*

RI
☐ RES DEC
☐ I/C DEC
☐ GA Leachability
☐ GB Leachability
☐ GA -GW Objectives
☐ GB -GW Objectives
☐ Other

CT
☐ RCP Cert
☐ GWPC
☐ SWPC
☐ GA PMC
☐ GB PMC
☐ SWPC
☐ RES DEC
☐ I/C DEC

MA
☐ MCP Certification
☐ GW-1 ☒ RCS-1 / RCGW-1
☐ GW-2 ☐ RCS-2 / RCGW-2
☐ GW-3 ☐ _____
☐ S-1
☐ S-2
☐ S-3
☐ SW Protection

Data Format
☑ Excel
☐ PDF
☐ GIS/Key
☐ EQuIS
☐ Other

Data Package
☐ Tier II Checklist*
☐ Full Data Package*
☑ Phoenix Std
☐ Other

*MS/MSD are considered site samples and will be billed as such in accordance with the prices quoted.

* SURCHARGES MAY APPLY

State where samples were collected: MA.

* SURCHARGE APPLIES

Form PEL126 Rev. 1/23

Sarah Bell

Subject: FW: Projects L12961 and L12962

Sarah Bell
Project Manager
Phoenix Environmental Laboratories
587 East Middle Turnpike
Sarah@phoenixlabs.com
860-812-0270
Website: www.phoenixlabs.com

From: Jon Puliafico <jpuliafico@Coneco.com>
Sent: Monday, August 19, 2024 11:05 AM
To: Sarah Bell <sarah@phoenixlabs.com>
Subject: Projects L12961 and L12962

Hi Sarah,
Great talking with you earlier.

Please change L12961 to 12961
L12962 to 12962

Is it possible to included specific standard(s) with the data in the spreadsheet?
Jon

Jonathon Puliafico
Senior Project Manager
Lord Environmental
A Coneco Engineers & Scientists, Inc. Company

4 1st Street, Bridgewater, MA 02324
Mobile: 401-487-7630
jpuliafico@coneco.com
Website

SECTION 32 12 16

BITUMINOUS PAVING

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade.

1.02 SCOPE OF WORK

A. The work of this Section consists of paving work and related items, as indicated on the Drawings and as specified herein.

1. Grading and compaction of sub-base and gravel base course.
2. Base course construction.
3. Bituminous concrete walk pavement.
5. Patching and resurfacing existing disturbed paved areas.

1.03 RELATED WORK

1. Section 311000 – Site Clearing and Preparation.
2. Section 312000 – Earthwork.
3. Section 323000 - Site Improvements.

1.04 REFERENCES

A. Reference to Mass. SSHB shall mean the Commonwealth of Massachusetts Highway Department “Standard Specifications for Highways and Bridges,” latest edition as last amended.

1.05 SHOP DRAWINGS

A. Submit complete shop drawings to Architect for approval.
B. Submit mix formula for bituminous pavement for Architect's approval.

1.06 PROJECT CONDITIONS

A. Weather: Perform work only when existing and forecasted weather conditions are within the limits established by referenced standards. Perform work only when ambient temperature is forecasted to be at least 50-degrees Fahrenheit and when temperatures have not been below 35-degrees Fahrenheit for 12 hours immediately prior to application. Do not apply when base is wet or contains an excess amount of moisture or is in a frozen state.
B. Asphalt paving shall not be applied until the finished compacted gravel base has been tested and approved. A delay in paving after the gravel base is tested and approved may require re-compaction and testing at no additional cost to the Owner.

C. Construction methods, transportation and delivery of mixtures, spreading, finishing, compaction joints, etc. shall conform to Section 460 of the Massachusetts Department of Transportation Standard Specifications for Highways and Bridges unless otherwise specified herein.
D. Substrates: Proceed with work only when substrate construction and penetrating work is complete and base is dry.
E. Traffic Control: Maintain access for vehicular and pedestrian traffic and other construction activities.
F. Grade Control: Establish and maintain required lines and elevations.

1.06 QUALITY ASSURANCE

A. Bituminous concrete shall be prepared, mixed, transported, placed, compacted and finished in accordance with the requirements set forth in the latest edition of the Mass. SSHB.

B. Tolerances

1. Establish and maintain grade control to required elevations and slope tolerances indicated on the Drawings. The maximum deviation in the finished surface planarity shall be 3/16 inch when measured in any direction with a 10 ft. straightedge.

C. Laser-guided grading equipment shall be used for final grading of the gravel base to ensure conformance with specified tolerances

1.07 TESTING

A. During the placing and rolling operation, repeated checks shall be made to ascertain the correct rate of application to provide the required compacted thickness.

B. If the average thickness is deficient from the specified thickness by one quarter (1/4) inch or more, the extent of the deficient area shall be corrected at the Contractor’s expense.

C. Upon completion of testing, the Contractor shall properly fill all test holes by compacting a fine aggregate bituminous concrete for the full depth of the core. The finished surface shall be smooth.

1.08 COORDINATION

A. The work of this Section shall be coordinated with that of other trades affecting, or affected by, this work, as necessary to assure the steady progress of all work of the Contract.

1.09 GUARANTEE

A. The Contractor shall obtain in the Owner's name the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities which the Contractor may have by law or other provisions of the Contract Documents.

1.10 LAYOUT AND GRADES

A. All line and grade work not presently established at the site shall be laid out by a Registered Land Surveyor or Registered Professional Engineer employed by the Contractor in accordance with Drawings and Specifications.

B. The words "finished grade" as used herein shall mean final grade elevations indicated on the Drawings. Spot elevations shall govern over proposed contours. Where not otherwise indicated, project site areas outside of the building shall be given uniform slopes between points for which finished grades are indicated or between such points and existing established grades.

1.10 JOB CONDITIONS

A. Bituminous concrete paving shall not be placed when the ambient temperature is below 40 degrees F., or when there is frost in the base, or any other time when weather conditions are unsuitable for the type of material being placed.

1.11 DISTURBING EXISTING PAVEMENT DURING CONSTRUCTION

A. Existing paved areas shall be protected from damage by construction activities to the extent possible. Where sections of the finished paved areas have to be removed, the edges shall be saw cut in all cases and patched as described herein under the paragraph entitled "Patching Existing Pavement".

B. Existing finished paved areas that require extensive cutting and patching or have become damaged and cannot be satisfactorily repaired by cutting and patching shall be resurfaced. These resurfaced areas shall be large enough to be applied by paving machines. Shape of these resurfaced areas shall be neat and in rectangular patterns or shall conform to shape or edges of other adjacent surface improvements. Edges of resurfaced areas shall be saw cut and existing pavement shall be removed for a distance of two feet into area to be resurfaced, so that new pavement can neatly blend into existing pavement, showing no joints or imperfections. If the gravel base course has been disturbed, the Contractor shall remove the disturbed material and place a minimum of 12 inches of gravel base course, compacted as specified in Section 3112000, EARTHWORK.

C. All paving beyond the property line of the project shall be in accordance with the requirements of the City of Worcester. Provide traffic control for any work within the town rights of way.

PART 2 - MATERIALS AND EXECUTION

2.01 GRADING AND COMPACTION OF SUB-BASE AND GRAVEL BASE COURSE

A. Do all necessary grading in addition to that specified under Section 3112000, EARTHWORK to bring sub-base and gravel base course after final compaction to required grades and sections for bituminous pavements. Tamp traces of trenches. Remove spongy and otherwise unsuitable material and replace with approved material. Loosen exceptionally hard spots and recompact. Take every precaution to obtain a foundation of uniform bearing strength. In absence of specific requirement, compact foundation by such means as will provide firm base and insurance against settlement of superimposed work.

B. Sub-base and gravel base course preparation, including material, shall be of proper approved quality as specified under Section 02300, EARTHWORK. Start of work under this Section shall constitute acceptance of the foundation conditions to which this work is to be applied. Any defects in work resulting from such conditions shall be corrected under this Section at no extra cost to the Owner.

C. Maintain sub-base and gravel base course in satisfactory condition and properly drained until surface improvement is placed.

2.02 SUBBASE AND BASE COURSE CONSTRUCTION

A. Dense Graded Crushed Stone for Subbase or Reclaimed Pavement Borrow Material for Base Course and Gravel Borrow shall be placed to the depths shown on the Drawings in accordance with Section 02300, EARTHWORK.

1. The gradation shall conform to Dense Graded Crushed Stone, Reclaimed Pavement Borrow and Gravel Borrow as specified in Section 02300, EARTHWORK.

2. For Subbase and Base Course, the above gradation shall be determined by a mechanical wet sieve analysis and in accordance with ASTM D-422.

3. Dense Graded Crushed Stone shall be tested and graded according to the requirements specified in Section 02300, EARTHWORK. Reclaimed asphalt pavement that can be obtained through removal of existing roads and parking areas that have been in place for more than one year can be used in lieu of Dense Graded Crushed Stone in areas where Dense Graded Crushed Stone is shown and detailed on the Drawings if it conforms to the following requirements:

   a. The existing full depth of the Bituminous Concrete and at least three inches and not more than six inches of the underlying base materials shall be crushed/pulverized simultaneously with impact crushing or pulverizing hammermill equipment. The actual depth of the base materials may have to be adjusted to produce a material similar to the characteristics of the Crusher Run Stone. This simultaneous crushing/pulverizing shall blend the asphalt and base materials into a homogeneous mass wherein the increased fractured faces of the aggregate and the residual asphalt cement acquired from the existing pavement section forms the desired base course. After the material has been worked, it may be stripped separately from the underlying undisturbed base course for reapplication where Crusher Run Stone is called for on the Drawings.

   b. The Contractor shall be exceedingly careful not to disturb or break existing manholes, catch basins, valve boxes, and other castings, which may be located in the surface of the existing pavements.

   c. Reclaimed asphalt pavement may be used from all site sources if it conforms to requirements specified herein. No off-site reclaimed asphalt shall be used.

4. The Contractor shall submit samples for testing as specified in Section 02300, EARTHWORK, of materials from the borrow pit he intends to utilize. No materials shall be brought to the job until material is approved by the Architect.

5. The Dense Graded Crushed Stone for Subbase or Reclaimed Pavement Borrow Material for Base Course and Gravel Borrow shall be spread in layers from self-spreading vehicles or with power graders of approved types or by hand methods upon the prepared subgrade. The base course materials shall be compacted to not less than 95% of the maximum dry density of the materials as determined by the Method of Test for ASTM Designation D-1557, Method D. Compaction shall continue until the surface is even and true to the proposed lines and grades within a tolerance of 3/8" above or below the required cross sectional elevations and to a maximum irregularity not exceeding 3/8" under a ten-foot line longitudinally. Any specific area which, after being rolled, does not form a satisfactory, solid, stable foundation shall be removed, replaced, and recompacted.

6. Maintain base course in satisfactory condition protected against traffic and properly drain, until the surface improvement is placed. In areas to receive pavement, place grade stakes spaced sufficiently to afford facility for checking and subgrade levels. Correct irregularities compacting thoroughly any fill materials.

7. Check for correct elevation and position all manhole covers, grates, valve boxes, and similar structures, located within areas to be paved or surfaced and make or have made, any necessary adjustments in such structures.

2.03 BITUMINOUS CONCRETE PAVING

A. Bituminous concrete shall be composed of mineral aggregate, mineral filler, and bituminous material and shall be Class I Bituminous Concrete Pavement, Type I-1, as defined in Section M3.11.00 in the latest amended edition of the Mass. SSHB Spec. Bituminous tack coat, where required, shall conform to Section M3.11.06.

B. Areas that may have to be resurfaced, or areas where binder course is left exposed for a prolonged period of time and are subject to vehicular traffic shall require a bituminous tack coat prior to application of a surface treatment course as specified in Section M3.11.03 of the Mass. SSHB. The pavement shall be cleaned of all foreign matter and loose material and shall be completely dry prior to application of the tack coat.

C. Paving in all other areas requiring bituminous concrete pavement shall be laid in two courses except as noted on the Drawings. The thickness of each course shall be as shown on the Drawings and measured in place after rolling. First course shall be "Binder Course" and second course shall be "Top Course" as defined in "Table-Composition Limits-Master Ranges" of Section M3.11.03 "Job Mixture Formula" in the latest amended edition of the Mass. SSHB.

D. Paving thickness, as shown on the Drawings.

E. For the purpose of testing the finished surfaces of the base courses and/or binder course and the top course of compacted mixtures, a 16-foot straightedge shall be used. The straightedge shall be carefully applied immediately after first compaction by rolling and, from then on, as may be necessary until and after the final compaction of the material is in place. The straightedge shall be held in successive positions parallel to the direction pitch of paving and in contact with the surface; and the entire area checked from one side to the other of the pavement. Any irregularities which vary 3/8 inch from a true surface in base or binder course and 1/4 inch from surface treatment shall be corrected. Irregularities, which may develop before the completion of rolling and while the material is still workable, may be remedied by loosening the surface mixture and removing or adding material as necessary. Any unsatisfactory irregularities or defects remaining after final compaction shall be corrected by removing and replacing with

new material, as specified, to form a true and even surface. All minor surface projections, joints and minor honeycombed surfaces shall be ironed out smoothly to grade, as may be directed. Adequate and approved straightedges shall be furnished and used by the Contractor. The Contractor shall provide or designate an employee whose duty it shall be to carefully use the straightedge to check the compacted surfaces.

F. If, at any time before the final acceptance of the work, any soft, imperfect places or spots shall develop in the surface, all such places shall be removed and replaced with new materials and then compacted until the edges at which the new work connects with the old becomes invisible.

G. No vehicular traffic or loads shall be permitted on the newly completed pavement until adequate stability has been attained and the material has cooled sufficiently to prevent distortion or loss of fines.

H. No construction traffic or loads shall be permitted on the "Binder Course" prior to placement of the "Top Course".

2.04 PATCHING EXISTING PAVEMENT

A. In areas on site where new pavement abuts existing pavement and/or where existing pavement requires patching due to removal of existing pavement for installation of work under this contract, patching of existing pavement shall be as follows:

1. Cutting by mechanical means: all pavement surfaces shall be cut by an approved mechanical means before any excavation is started to insure against unnecessary damage to pavement.

2. Temporary Patch: all trenches shall be resurfaced with a temporary patch at the end of each working day with a minimum thickness of three inches of bituminous concrete or cold patch. This shall be maintained by the Contractor until the permanent patch can be applied.

3. The edge of existing pavement shall be saw cut in a straight line at a 45-degree angle to the vertical in such a manner that all existing loose or cracked areas of pavement are removed.

4. Edges of existing pavement shall be painted with a thin coat of bitumen (RS-1) immediately before placing new pavement.

5. Bituminous concrete pavement shall be installed as specified hereinbefore. Smooth transition surfaces shall be provided where new pavement abuts existing paved surfaces. Pavement depths shall match design thickness of abutting surfaces.

6. Materials:

   a. Bituminous concrete surfacing materials shall conform to Section 460, "Class I Bituminous Concrete Pavement" of said Mass. SSHB. Gradations of mix will be directed by the Architect to suite the use intended.

   b. Bituminous cold patching materials shall conform to Section 472, "Bituminous Concrete for Patching" of Mass. SSHB.

c. Tack coating shall be done with an approved bituminous tacking material spread along the contact areas at all joints.

d. Joint sealing shall be done with hot bituminous or other approved sealing compounds poured onto the rolled joint followed by a fine sand covering.

7. Permanent Patch:

a. All trenches shall be cut back one foot on each side from original cut by an approved mechanical means.

b. Twelve inches of approved Gravel Fill shall be placed in two layers and compacted by mechanical means to 95%.

c. Three inches of bituminous concrete shall be placed in two layers consisting of a two-inch binder and one inch top and rolled with a powered roller having a weight of five tons or more. Existing pavements thicker than three inches shall be replaced to an equal thickness using materials as similar as possible to the existing (concrete or cobblestone with concrete, crushed stone with bituminous concrete, etc.).

d. Before placing bituminous concrete, all joints shall be satisfactorily emulsified and after placing top course of bituminous concrete, all joints shall again be emulsified and sanded using screened sand.

e. The Contractor shall maintain pavement during the guarantee period of one year from the date of permanent patching.

8. Resurfacing: In areas where numerous cutting and patching has occurred, or if existing pavements have been damaged by construction operations, these areas shall be resurfaced the full width of the roadway or paved area and extend a minimum of 20 feet beyond the patch in either direction. Edges of existing pavements shall be saw cut and notched so that the bituminous pavement resurfacing can neatly blend into the existing pavement. Surface tolerances of the resurfaced areas shall conform to surface tolerances for new bituminous paving as specified herein before, including tolerances at the point where resurfacing meets existing pavement. If, after inspection by the Architect, the pavement resurfacing does not neatly blend into the adjacent existing pavement, the area shall receive an infra-red treatment for a distance of three feet from the edge of the resurfacing. Immediately after softening the existing pavement, the area shall be rerolled. The final rerolled area shall blend into the new pavement with no depression greater than 1/4 inch and show no roller marks.

a. Tack Coat: all areas to be resurfaced shall be thoroughly swept clean and receive a bituminous tack coat prior to resurfacing.

b. Thickness: minimum thickness of resurfacing shall be one inch and composition of mix shall be Top Course to match Top Course to be applied for new pavements.

9. Cutting and Patching of New Pavements: cutting and patching of new pavements to be installed under the work in this Contract will not be allowed after final bituminous surfacing has been applied. If it is determined that no other alternative exists and cutting and patching of new pavement is required, the Contractor shall follow procedures specified herein for cutting and patching and take additional measures, including infra-red treatment, to assure final patch blends in completely with new pavement.

B. All work within the public right of way shall be in accordance with the requirements of the towns. However, cutting, patching and resurfacing specified herein shall be considered the minimum requirements for work within the town rights of way.

1. Provide traffic and safety control for work within the public right of way.

2.05 RECLAIMED BASE COURSE CONSTRUCTION

A. The reclaimed base course shall consist of a base course composed of the existing bituminous concrete pavement and granular base course, pulverized, fine graded and compacted on the underlying subgrade in accordance with these specifications.

B. This item shall include the pulverizing and processing of the existing asphalt pavement and granular base, and fine grading and compacting a new base for the new additional bituminous courses.

C. Maintain base course in satisfactory condition protected against traffic and properly drain, until the surface improvement is placed. In areas to receive pavement, place grade stakes spaced sufficiently to afford facility for checking and subgrade levels. Correct irregularities compacting thoroughly any fill materials.

D. Prior to the start of construction, the Contractor shall remove and store all castings from structures and gate boxes within the work area. Masonry shall be removed as required to allow for placing a steel plate over each structure, with the steel plate being at least 12 inches to 15 inches below the proposed grade of the reconstructed roadway. The Contractor shall make provisions to accommodate storm water runoff during the period any catch basins are covered with plates. The Contractor shall obtain a minimum of three "tie" dimensions for each structure or gate box and shall furnish a copy of sketches showing these dimensions to the Owner.

Upon completion of the first course of bituminous concrete pavement, the Contractor shall carefully cut through the bituminous concrete pavement (maximum allowable are for pavement cut: 4' diameter for structure: 2' diameter for gate boxes), remove the steel plate, and set the casting to the required line and grade.

E. Sawed Joints: Where indicated on the plans at project ends and intersections, the existing pavement shall be sawed to its full depth.

F. Materials: The reclaimed aggregate base material, after the hammermilling and/or blending of additional materials, shall conform to the following gradation requirements:

Sieve Size	Blend*	Recommended Grading Range
3"	100	100
2	98	90-100
1	90	---
¾	86	---

½	79	50-85
3/8	74	---
#4	62	40-75
10	54	---
20	45	---
40	33	10-35
80	20	---
200	10	2-12

Asphalt Content 1.3

*Blend: Bituminous concrete (as exists) with three to four inches of existing gravel base. The intent of the above blending and hammermilling is to obtain, after fine grading and trimming, a reclaimed asphalt base on which a new bituminous pavement shall be installed to approximate grades of the previously existing pavement.

G. Equipment: The equipment to be used must have an established capability of pulverizing bituminous concrete pavements to produce a crusher material. In addition, the equipment must have an established record of being capable of producing the pulverized material at a rate of production satisfactory to the Architect. The equipment must have the capability to adjust the crushers and screens to allow minor adjustments if the gradation of the crushed material does not fall within the gradation requirements during the crushing process.

H. Pulverizing: The existing full flexible pavement structure and the above-referenced depth of the underlying base materials (3" minimum to 6" maximum) shall be crushed/ pulverized simultaneously with impact crushing or pulverizing/hammermill equipment. This simultaneous crushing/pulverizing shall blend the asphalt and base materials into a homogeneous mass, wherein the increased fractured faces of the aggregate and the residual asphalt cement acquired from the existing pavement sections forms the desired dense base course.

The reclaimed base course shall be approved by the Soils Testing Representative before grading operations are started. Any ruts or soft, unyielding places caused by improper drainage conditions, hauling or any other cause shall be corrected.

I. After the material has been thoroughly worked, as described in the above paragraph, it shall be shaped and graded to the required lines and elevations. Water shall be applied during the entire operation to ensure optimum moisture content at the time of compaction. In conjunction calcium chloride will be applied at the rate designated by the Architect. Unless otherwise specified or shown on the drawings, the material shall be shaped and graded to provide a base to receive a new two-course bituminous pavement that will meet surface tolerance of new bituminous pavement, and be at approximate grades and elevations of the previously existing pavement. To achieve this, some of the reclaimed base may have to be removed during shaping and grading. All surplus material shall be removed from the site or used where allowed in other parts of the work.

J. Grade control between the edges of the pavement shall be accomplished by grade stakes, steel pins, or forms placed in lanes parallel to the centerline of the pavement at intervals sufficiently close that string lines or check boards may be placed between the stakes, pins or forms. To protect the underlying course and to ensure proper drainage, the spreading of the base shall begin along the pavement on a crowned section or on the high side of the pavement with a one-way slope.

K. Placing and spreading: The base course shall be placed to the width and depths as specified herein. The aggregate, as spread, shall be uniform gradation with no segregation or pockets of fine or coarse materials. This aggregate shall not be spread more than 2,000 square yards in advance of the rolling. Any necessary sprinkling shall be kept within these limits. No material shall be placed in snow or on a soft, muddy or frozen underlying course. The existing undercut material utilized in the mix shall be distributed evenly in the overall mix so as to provide a uniform mixture or reconstituted base material.

L. Compaction and maintenance of reclaimed base course construction to be provided under Section 312000, EARTHWORK.

2.06 CLEANING, REPAIR AND PROTECTION

A. Three days after rolling, the finished pavement shall be tested. Any section that shows ponding, indentation, rutting or picking up shall be resurfaced at the Contractor's expense.

B. Provide temporary protection to ensure work is completed without dirt, stains, damage or deterioration at time of final acceptance. Clean up stains and spills as they occur. Remove protection and clean as necessary immediately before final acceptance review.

2.07 GUARANTEE

A. The Contractor shall guarantee all pavement, including materials and workmanship, for a period of one year from the date of acceptance. The Contractor shall make interim repairs as necessary to maintain all paved areas in good, usable conditions.

END OF SECTION

SECTION 32 30 00

SITE IMPROVEMENTS

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

B. Examine all Drawings and all other sections of the Specifications for requirements therein affecting the work of this trade.

1.02 SCOPE OF WORK

A. The work of this Section consists of general site improvements and related items, as indicated on the Drawings and as specified herein, including:

1. Compaction and fine grading of sub-base and gravel base course.
2. Portland cement concrete pavement for exterior walks and door pads.
3. Cast-in-place concrete and concrete footings for site improvement items.
4. Steel pipe handrails (exterior only).
5. Site signage and information systems.

1.03 RELATED WORK

A. Section 311000 Site Clearing and Preparation.
B. Section 312000 Earthwork.
C. Section 321313 Concrete Paving.
D. Section 321200 Bituminous Paving
E. Section 329100 Loam and Planting Preparation

1.04 SHOP DRAWINGS

A. Submit complete shop drawings to Architect in accordance with Division 1.

B. Shop drawings shall be submitted for all site improvements listed herein.

1.05 COORDINATION

A. The work of this Section shall be coordinated with that of other trades affecting, or affected by, this work as necessary to assure the steady progress of the Contract.

1.06 GUARANTEE

A. In addition to the specific guarantee requirements of the GENERAL CONDITIONS and GENERAL REQUIREMENTS, the Contractor shall obtain in the Owner's name the standard written manufacturer's published guarantee. All these guarantees shall be in addition to, and not in lieu of, other liabilities which the Contractor may have by law or other provisions of the Contract Documents.

PART 2 - PRODUCTS AND EXECUTION

2.01 COMPACTION AND FINE GRADING OF SUB-BASE AND GRAVEL BASE COURSE

A. Do all necessary grading in addition to that specified under Section 312000, EARTHWORK to bring sub-base and gravel base course after final compaction to required grades and sections to obtain a foundation of uniform bearing strength. In absence of specified requirement, compact sub-base and gravel base course by such means as will provide firm base and insure against settlement of superimposed work.

B. Sub-base and gravel base course preparation, including material, shall be of proper approved quality as specified under Section 312000, EARTHWORK. Start of work under this Section shall constitute acceptance of the foundation conditions to which this work is to be applied. Any defects in work resulting from such conditions shall be corrected under this Section, Site Improvements, at no extra cost to the Owner.

2.02 PORTLAND CEMENT CONCRETE PAVEMENT FOR EXTERIOR WALKS AND DOOR PADS

A. Portland Cement Concrete Pavement

1. Concrete, steel reinforcing and the equipment, workmanship, and materials thereof shall conform to the requirements of Section 321313, CONCRETE, except as hereinafter specified. Concrete shall have a minimum compressive strength of 4000 lbs. per square inch at 28 days. The maximum size of coarse aggregate shall be 1-1/2 inches. Concrete shall have a slump of not more than 3-1/2 inches. The concrete mixture shall have air content by volume of concrete, based on measurements made immediately after discharge from the mixer, of four to six percent. Air content shall be determined in accordance with ASTM C173.

2. Wire mesh and steel reinforcement - refer to drawings and Section 321313, CONCRETE.

B. Gravel Base Course Preparation: After compaction and preparation of the subgrade as specified in Section 312000, EARTHWORK, the gravel base course shall be constructed true to grade and cross section. The gravel base course shall be thoroughly wetted and then compacted with two passes of a 500-pound roller. Yielding material deflecting more than ½-inch under the specified roller shall be completely removed and replaced with approved gravel fill, which shall then be compacted as described above. The completed base course shall be tested for grade and cross section with a template. The base course shall be maintained in a smooth, compacted condition, in conformity with the required section and established grade until the concrete is placed. In cold weather, the base course shall be prepared and protected so as to provide a foundation free from frost when the concrete is deposited.

C. Forms: Forms shall be of wood or steel, straight, of sufficient strength to resist springing during depositing and consolidating concrete and of a height equal to the full depth of the finished pavement. Wood forms shall be surfaced plank, two-inch nominal thickness. Steel forms shall be approved section with a flat top surface. Forms shall be set with the upper edge true to line and grade and shall be held rigidly in place by stakes placed at intervals not to exceed four feet. Forms shall be coated with form oil each time before concrete is placed. Wood forms may instead be thoroughly wetted with water before concrete is placed, except that with probably freezing temperatures, oiling is mandatory. Side forms shall not be removed for less than 12 hours after finishing has been completed.

D. Reinforcement: Place 6 x 6 x 10/10 welded wire mesh in all concrete walks and bar reinforcing in pavements where shown on Drawings.

E. Concrete Placement and Finishing: Concrete shall be placed in the forms in one layer of such thickness that when compacted and finished, the pavement will be of the thickness indicated. Pour concrete in alternate sections. After the concrete has been placed in the forms, a strike-off guided by the side forms shall be used to bring the surface to the proper section to be compacted. The concrete shall be tamped and consolidated with a suitable wood or metal tamping bar, and the surface shall be finished to grade with a wood float. The finished surface of the pavement shall not vary more than 3/16 inch from the testing edge of a ten-foot straightedge. Irregularities exceeding the above shall be satisfactorily corrected. The surface shall be divided into rectangular areas by means of control joints or score joints as indicated on the drawings. The surface of sidewalks and shall be "broom" finished to provide a skid-resistant finish. Concrete sidewalk shall be broom finished with a troweled edge. The direction of broom finish shall be perpendicular to the direction of traffic unless otherwise shown on the drawings. Concrete for loading dock and trash compactor pads shall be wood float finished.

1. Score Joints: The score joints shall be formed in fresh concrete, after broom finishing, but before the concrete has taken set, with a hand-held scoring tool producing a 3/8 inch width x 3/4 inch (plus or minus) deep groove and a trowel finish of 3" x 1/4" each side of the groove at the locations indicated on the plans and details. The final tooled joint shall have a smooth surface resembling a steel troweled finish with rounded edges. There shall be no pock marks, air bubbles or rough surfaces. Saw cut joints may be substituted for hand tooled joints at the Contractor's option.

2. Control Joints: The control joints shall be formed in the concrete by saw cutting a groove in the top portion of the slab (to a depth of at least 1/4 of the pavement slab thickness) with a power-driven saw. All saw cuts shall be made within 24 hours after placement of the concrete. Provide two parts polyurethane base sealant conforming to Federal Specifications TT-S-00227E, Class A where shown on the Drawings and as specified herein. Color of sealant shall be approved by the Architect and, in general, match color of adjacent surfaces.

3. Expansion Joints: Transverse expansion joints shall be installed at pavement returns and opposite expansion joints in adjoining curbs. Where the pavement is not in contact with the curb, transverse expansion joints shall be installed as indicated. Transverse expansion joints shall be filled with 1/2 inch thick joint filler strips conforming to ASTM D1757 or D1752 or with resin-impregnated fiberboard conforming to the physical requirements of ASTM D1752. Polyethylene foam board shall be used where tight radius and curves occur. This shall be "Form Filler" by A. C. Horn Co., or approved equal. Joint filler shall be placed with a top edge 3/4 inch below the surface and shall be held in place with steel pins or other devices to prevent warping of the filler during floating and finishing. Immediately after finishing operations are completed, joint edges shall be rounded with the edging tool having a radius of 1/8 inch, and concrete over the joint filler shall be removed. Expansion joints shall be formed around structures and features that project through or into the pavement, using joint filler of the type, thickness, and width indicated. The filler shall be installed in such manner as to form a complete uniform separation between the structure and pavement. At the end of the curing period, expansion joints shall be carefully cleaned and filled with joint sealer conforming to Federal Specification TT-S-00227E, Class A. The concrete at the joint shall be surface dry, and the atmospheric and pavement temperatures shall

be above 50 degrees F at the time of application of joint-sealing materials. The joints shall be filled flush with the concrete surface in such manner as to minimize spilling on the surface. Spilled sealing material shall be removed immediately and the surface cleaned. Dummy groove joints shall not be sealed.

4. Surface Uniformity: The completed surface shall be uniform in color and free of surface blemishes and tool marks.

F. Curing: Immediately after the finishing operations, the exposed concrete surface shall be cured by preventing the loss of moisture for seven days by the wet cure method. The Contractor's detailed curing procedure shall be subject to the approval of the Architect. See Section 321313, CONCRETE, for wet curing requirements.

G. Backfilling: After curing, debris shall be removed, and the area adjoining the pavement shall be backfilled, graded, and compacted to conform to the surrounding area in accordance with the lines and grades indicated.

H. Protective Coating: A protective coating shall be applied to all exposed-to-view Portland cement pavements.

1. Apply Chem-Trete BSM 40 VOC as manufactured by Huls America, Inc., 80 Centennial Ave., Piscataway, NJ, at a rate of 175 to 200 SF/gal. to all exposed-to-view Portland cement concrete surfaces or pavement. Remove all dirt, oil, etc., and all traces of curing compound prior to installation. Install per manufacturer's recommendations and submit product information for Architect's approval.

2.03 CAST-IN-PLACE CONCRETE AND CONCRETE FOOTINGS FOR SITE IMPROVEMENT ITEMS

A. Construct concrete footings and cast in place concrete where shown on the Drawings.

B. Concrete for walks, walls and surfaces exposed to the weather shall be 5000-lb. air-entrained mixture as specified in Section 321313, EXTERIOR CONCRETE. Concrete for footings shall be 4000 lb. concrete as specified in Section 321313, EXTERIOR CONCRETE.

C. Pre-molded expansion joint fill shall be resilient type non-bituminous, meeting ASTM D545, as last amended, of thickness and widths required for the expansion joint width. Provide two parts polysulfide base sealant conforming to Federal Specification TT-S-00227A, Class A where shown on the Drawings and as specified herein. Color of sealant shall be approved by Architect and, in general, match color of adjacent surface.

D. Place concrete on approved moist subgrade, approved gravel base course or against prepared footings in continuous operation between transverse joints or individual sections. Vibrate all concrete. Do not place concrete in freezing temperatures or on frozen base. Pour concrete in alternate sections.

E. Screed the concrete true to grade and sections as shown on the Drawings. Surface of concrete steps should have striated broom finish and steel trowel borders. Round all edges. Broom marks shall be at right angles to main axis of stairway.

F. Forms shall be strong enough to resist pressure of the concrete without springing, and tight enough to prevent leakage of mortar. Forms shall be staked, braced or tied together to maintain their position and shape when concrete is vibrated in place. Forms shall be clean and shall produce a smooth,

even finish for exposed surfaces. Reinforce footings and cast in place items as shown on Drawings and per requirements in Division 3. Provide openings in concrete for handrails as specified in this Section.

G. Provide expansion joints with pre-molded filler where shown on the Drawings. Expansion joints shall extend full depth of concrete and to surface of adjacent site improvement. Pre-molded filler shall extend to within 1/2 inch of the finished surface and be sealed with polysulfide sealant as specified herein.

H. Remove no forms for 24 hours after placing concrete. Protect concrete stairs and walks from pedestrian traffic for a period of three days after placing and damp cure.

I. All applicable parts of these Specifications referring to cast-in-place concrete and all applicable parts of the structural drawings shall apply for forming, reinforcing workmanship and quality control for all work specified herein above. Provide shop drawings for items where reinforcing is indicated on Drawings.

2.04 STEEL PIPE HANDRAILS (EXTERIOR ONLY)

A. Provide handrails for all exterior concrete steps where shown on the Drawings. Refer to architectural drawings for details and specification references for all interior handrails. Interior handrails are not specified in this Section. Railings shall be constructed in conformance to the rules and regulations of the American Disabilities Act.

B. All materials shall be new stock, free from defects impairing strength, durability and appearance, and of best commercial quality for purpose specified. Rails shall be fabricated of standard weight steel pipe of Schedule 40, ASTM A53, 1.900 in. O.D. pipe with a minimum weight of 2.72 pounds per lineal foot. Rails shall have flush type fittings and welded connections. All fabrication and workmanship shall meet applicable building codes. Metal railing work shall be true to details, straight with sharp lines and angles. Curved work shall be true to radii, and with smooth finished surfaces. Grind exposed welds smooth and flush to blend with adjoining surfaces.

C. There shall be no field cuts in galvanized work unless authorized by Architect. If approved, field cuts in galvanized work shall be touched up with ZRC, as manufactured by the Sealube Company, Quincy, MA, or approved equal zinc-rich coating. Any exposed cuts in galvanized work or damaged areas shall be rejected.

D. Galvanizing:

1. Galvanizing shall be done by the hot-dip process in accordance with ASTM A-123 and the weight of the zinc coating for the various thicknesses of steel shall correspond to said ASTM A123. All coating must be done within six hours of galvanizing. The galvanizing bath shall contain high-grade zinc. Immediately before galvanizing, the steel shall be in a bath of zinc ammonium chloride. The use of the wet kettle process is prohibited.

2. Galvanized fastenings only shall be used in connection with galvanized items. Galvanizing of bolts and similar threaded fasteners, if required, shall be in accordance with ASTM A153.

3. Where galvanized steel is indicated to be primed for a field applied topcoat, provide factory-applied polyamide epoxy primer over specially prepared galvanized steel, 2.0 mils dry film thickness minimum. Apply primer within 12 hours after galvanizing at the galvanizer's plant in a controlled environment meeting applicable environmental regulations, and as recommended by coating manufacturer.

Engage the services of a galvanizer who has demonstrated a minimum of five (5) years experience in the successful performance of the processes outlined in this specification in the facility where the work is to be done and who will apply the galvanizing and coating within the same facility as outlined herein.

4. A notarized statement from galvanizer indicating conformity to the ASTM specifications shall be submitted to the Architect at the time of the initial shipment to the job site.

E. Submit shop drawings for all handrails and wall rails showing size, thicknesses of materials, methods of assembly, anchorage and all other information.

F. Perform necessary field measurements prior to fabrication.

G. Installation of Exterior Handrails:

1. Coordinate work with all other trades; install as shown on the Drawings.

2. All materials shall be carefully handled and stacked to prevent damage and to prevent the accumulation of mud, dirt or other foreign matter on the work. All such dirt or other foreign material shall be removed prior to erection.

3. Work shall be erected square, plumb and true, accurately fitted, with tight joints and intersections. Unless otherwise shown, all connections which will be exposed shall be welded and ground smooth.

4. Set handrails in POR-ROK expanding grout as manufactured by Hallemite Manufacturing Co., Cleveland, Ohio, or approved equal, used strictly in accordance with manufacturer's directions. Hole to receive member shall be formed with galvanized sheet metal sleeve and provide at least 1/2 inch clearance around entire perimeter. Hold expanding grout back 1/2 inch from finish surface and fill void with Portland Cement grout to match color and texture of adjacent surface.

5. Unless otherwise directed by Architect, fabricated handrail units shall be shop primed and painted with one coat of paint. After installation, rails shall be field painted with a second coat of paint.

5. Conform to all applicable requirements of Section 05500, MISCELLANEOUS METALS, for additional fabrication, coating, and installation requirements.

2.05 FABRICATED METAL RAILINGS AT WALKWAY (EXTERIOR ONLY)

A. Submittals: Manufacturer’s data including instructions, recommendations, and restrictions. Submit for each material and product. Provide shop drawings engineered, prepared, sealed, and signed by the Contractor’s engineer.
B. Steel tubing for handrails, shall be round seamless steel pipe in accordance with ASTM A53/A53M-99B. Sizes and layout shall be as shown on the drawings. Factory applied powder coat color:
C. Custom RAL colors to be selected and approved by Architect and owner.
D. Fabrication; As shown or, if not shown:

1. Match design intent indicated
2. Meet all Codes including barrier free regulations and requirements.
3. Provide welded assembly.
4. Return rail ends to walls or as indicated on drawings.
5. Cap all visible ends and hollow members with welded caps.
6. Fully shop fabricate work to the maximum extent possible.
7. Shop prefit field seams and joints.

F. Touch-up and Repair: For damaged coated surfaces, clean welds, bolted connections and abraded areas:
1. At galvanized surfaces, apply organic zinc repair paint complying with requirements of ASTM A780. Galvanizing repair paint shall have 65 percent zinc by weight. Thickness of applied galvanizing repair paint shall be not less than coating thickness required by ASTM A123 or A153 as applicable. Touch-up of galvanized surfaces with aerosol spray, silver paint, bright paint, or aluminum paints is not acceptable.

E. Warranty: The galvanizer shall furnish a warranty stating that the galvanizing topcoated in accordance with the specification shall remain free from more than 10% (percent) rust for a period of twenty (20) years.

F. Handling: Galvanizer shall handle, pack, and ship in such a manner as to minimize damage to the finish. Upon arrival at job site it shall be the Contractor's responsibility to take equal precautions. Since some surface damage is inevitable, suitable touch-up material shall be readily available from the galvanizer for the Contractor's use.

G. Shop Drawings: The contractor is required to provide detailed shop drawings for all metal fabrications specified herein.
2. Walkway Handrails: The Contractor shall submit detailed final drawings plans, sections and elevations for approval prior to ordering materials.
3. 2. Contractor shall submit a full color palette selection of CUSTOM color choices for approval by landscape architect for all factory applied color galvanized materials.

2.05 SITE SIGNAGE AND INFORMATIONAL SYSTEM

A. Contractor shall supply and install a site signage and informational system as specified herein.

1. Submit shop drawings for all signs for Architect's approval prior to fabrication; include all materials and graphics to be employed.

A. Accessible Route signs shall be freestanding, post-mounted signs.

1. Provide highest quality 3M Scotchlite (or approved equal) on aluminum traffic signs. Sign backgrounds, legends and borders shall be fabricated from high-intensity encapsulated lens reflective sheeting conforming to the Massachusetts Department of Transportation's Standard Specifications for Highways and Bridges and the Manual on Uniform Traffic Control Devices (MUTCD), latest editions. Provide signs with the following characteristics, and per Signage Legend on the Drawings:

2. Mounting: Tamperproof stainless steel bolted fasteners to 12-gauge galvanized steel 2" square posts. Final locations to be determined in field. Mounting height shall conform to MUTCD standards. Concrete footings per Contract Documents.

3. Sign panels shall be 16-gauge aluminum panels. Sizes, color and copy as indicated on the Drawings.

4. Lettering and symbols shall be surface applied 3M Scotchlite reflective vinyl material Series #580 or approved equal. All lettering shall be executed in such manner that all edges and corners of the letterforms are true, clean, correctly spaced, and photographically precise. All lettering and graphics must accurately reproduce the letterform. Colors shall be consistent with highway standards.

5. Letterform meeting referenced standards. Where no standard exists, letterform shall be as selected by the Architect.

6. Provide shop drawing submittal for those signs with no MUTCD code.

7. Support posts: 2" square steel tubing. The steel posts shall conform to ASTM-A366. The cross section of the post shall be square tube formed of 12 gauge (.105" U.S.S. Gauge) cold-rolled carbon steel sheets which have been zinc coated (1.25 oz.) conforming to ASTM-A525, carefully rolled to size and welded directly in the corner by high frequency resistance welding or equal and externally scarfed to agree with corner radii. Standard outside corner radius shall be 5/32" plus or minus 1/64".

8. Post finish: Powder coated and painted black, smooth, free of scratches, gouges, bulges, foreign matter or other imperfections.

END OF SECTION

SECTION 32 92 00

LAWNS

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade.

1.02 SCOPE OF WORK

A. The work of this Section consists of Lawn work and related items, as indicated on the Drawings, and as specified herein.

1. Supplying and spreading topsoil.
2. Seed and sod bed preparation.
3. Seeding, sodding and overseeding.
4. Maintenance.

1.03 RELATED WORK

A. Section 311000 – Site Clearing and Preparation.
B. Section 312000 - Earthwork.

1.04 SUBMITTALS

A. Submit the following samples, analyses and/or affidavits and manufacturer's product data to the Architect for approval.

B. Samples, Analyses, Affidavits:

1. Topsoil analysis from approved laboratory.
2. Fertilizer affidavit for weight and analysis.
3. Seed affidavit indicating proportion by weight, purity and germination.
4. Sod type indicating composition by variety.

C. Close out: Submit landscape maintenance manual for the overall project.

1.05 REGULATORY REQUIREMENTS

A. Strictly comply with all applicable codes, regulations and requirements having jurisdiction.
B. All fertilizer and pesticide applications shall be performed by a licensed applicator in strict conformance with all local, state and federal regulations. Notify the Architect at least two (2) weeks prior to scheduled date of application.

1.06 QUALITY ASSURANCE

A. All work shall be performed by experienced landscape professionals familiar with planting procedures and under the full-time supervision of a foreman who is a Massachusetts Certified Landscape Professional (MCLP).

B. Analysis of Materials: For each type of packaged material required for the work of this Section, provide manufacturers' certified analysis.

1.07 COORDINATION

A. The work of this Section shall be coordinated with that of other trades affecting, or affected by, this work, as necessary to assure the steady progress of all work of the Contract.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Stockpiled topsoil shall be screened of all stones one inch or more in diameter, sticks, plants, and other foreign materials prior to spreading.

B. The Contractor shall provide any additional topsoil necessary to complete the work under this Section from offsite sources if there is not sufficient material suitable to complete the work specified hereinafter. The Contractor shall submit samples and an analysis of each sample from each proposed source of offsite material.

1. Topsoil from offsite sources shall be a friable loam, typical of cultivated topsoils of the locality, containing at least two percent of decayed organic matter (humus). It shall be taken from a well-drained, arable site. It shall be free of subsoil, stones, earth clods, sticks, roots, or other objectionable extraneous matter or debris. It shall contain no toxic materials.

C. Lime shall be an approved agricultural limestone containing not less than 85% of total carbonates. Limestone shall be ground to such fineness that 50% will pass a 100 mesh sieve and 90% will pass through a 20 mesh sieve.

D. Commercial fertilizer shall be a complete fertilizer, at least 50% of the nitrogen of which is derived from natural organic sources of ureaform. It shall contain the following percentages by weights:

Nitrogen	(N)	10
Phosphorus	(P)	6
Potash	(K)	4

E. Fertilizers shall be delivered mixed as specified, in standard size unopened containers, showing weight, analysis and name of manufacturer. They shall be stored in a weather-proof storage place and in such a manner that is will be kept dry and its effectiveness not impaired. If and when bulk delivery and spreading of fertilizer is authorized, the Contractor shall provide the Owner's representative with a notarized written affidavit certifying its weight and analysis.

F. Superphosphate shall be composed of finely ground phosphate rock as commonly used for agricultural purposes containing not less than 18% available phosphoric acid.

G. Grass seed shall be fresh, clean, new crop seed composed of the following varieties mixed in the proportions by weight shown and testing the minimum percentages of purity and germination:

GENERAL LAWN MIX shall have the following seed mixture composition:

Scientific Name	Common Name	Proportion By Weight	Percent Purity	Percent Germination
Festuca arundinacea 'Cochise III'	Cochise IV Fescue	80%	95	90
Lolium perenne	Fiesta 4 Perennial Ryegrass	10%	95	90
Poa pratensis	Impact Kentucky Bluegrass	10%	85	90

1. All varieties shall be within the top 50 percent and 25 percent respectively, of varieties tested in National Turfgrass Evaluation Program, or currently recommended as low maintenance varieties by University of Massachusetts or the University of Rhode Island.
2. The seeding rate for the seed mix shall be 6 pound per 1,000 square feet.
3. Seed used for overseeding as specified herein shall be Perennial Ryegrass having 95%purity and 90% germination

Seed shall be sown at the rate of five pounds per one thousand square feet of area. The Contractor may submit an alternative seed mix for approval. However, the alternative seed mix must be superior in quality to the specified mix for the use intended.

H. Seed used for overseeding as specified herein shall be Annual Ryegrass having 95% purity and 90% germination.

I. Water shall be suitable for irrigation and free from ingredients harmful to plant life. Hose and other watering equipment required for the work shall be furnished by the Contractor.

J. TPI, Certified Turfgrass Sod quality; nursery-grown, cultivated grass sod may be used in this project and shall be 50% Merion Bluegrass and 50% Pennlawn Fescue or approved equal. It shall be one inch thick and taken from an approved plantation. Sod shall have been grown a minimum of two years growing seasons and have no dry or dead spots. Individual sod pieces shall be cut to a uniform size with square corners. Sod shall be kept moist and in good condition before laying. Contractor may submit other varieties of bluegrass and fescue for approval of the sod mix, but the proportion of bluegrass and fescue shall remain approximately 50/50 and the mixture submitted must be superior to the mixture specified. Sod type shall be submitted for approval by Architect prior to installation.

1. Sod shall be machine cut from an established sod farm specializing in the production and harvesting of top quality, grass turf products. Sod shall be machine cut at a uniform soil thickness of 3/4-inch +/- 1/4 inch, at the time of cutting. Measurement for thickness shall exclude top growth and thatch. Individual pieces of sod shall be cut to the supplier's standard width and length. Maximum allowable deviation from standard widths and lengths shall be 5 percent. Broken pads and torn or uneven ends will not be acceptable. Sod shall be at least one year old from time of original seeding.

2. Sod shall be free of grass species other than those specified in this section. Sod shall be free of weeds.
3. Sod shall be furnished and installed as either double 24" or single 48" rolls, and substrate compatible with existing/proposed soils.
4. Install using machinery with Low ground pressure tracked equipment suited for this type of mechanical installation.
5. Sod shall be harvested, delivered and installed within a period of 36 hours. Soil on sod pads shall be kept moist at all times.
6. Sod delivered to the construction site which does not conform to the requirements of this section will be rejected by the Landscape Architect and shall be removed from the site by the Contractor at no additional cost to the Owner. Sod found to contain unacceptable levels of unspecified grass species or weed species at any time up to and including Final Acceptance will be rejected by the Landscape Architect. Contractor shall remove such sod from the site at no additional cost to the Owner. Contractor shall replace unacceptable sod with new, approved sod at no additional cost to the Owner. The Landscape Architect shall be the sole judge of what constitutes acceptable or unacceptable levels of unspecified grass species or weed species.

PART 3 - EXECUTION

3.01 SPREADING OF TOPSOIL

A. Topsoil all areas disturbed by construction that have not been paved or otherwise built upon. Contractor shall obtain a topsoil analysis to determine proper quantity of soil additives. Submit results of analysis to Architect for approval.

B. Immediately prior to dumping and spreading the topsoil, the subgrade shall be loosened by discing, or by scarifying to a depth of at least two inches, to permit bonding of the topsoil to the subgrade where compaction has occurred.

C. The topsoil shall be uniformly distributed and evenly spread, and in sufficient depth to compensate for any shrinkage, so that the thickness of compacted topsoil shall be six inches. The topsoil depth shall be measured perpendicular to the plane of the finished grade. The spreading shall be performed in such a manner that fine grading, fertilizing, liming, and seeding can proceed with little additional soil preparation or tillage. Irregularities in the surface resulting from operations thereon shall be corrected to prevent the formation of depressions where water will stand.

D. Placement of topsoil shall be performed only when it can be followed within a reasonable time by the seeding or sodding operation. Any weed growth one inch or greater that may occur shall be removed by mechanical means prior to the seeding operation. New weed growth shall not be allowed to go to seed. After topsoiling and finish grading all heavy equipment, trucks, etc., shall not be permitted to travel on loamed areas. If this should occur, loamed areas shall be scarified to a depth of four inches.

E. Remove all roots, stumps, debris and other noxious materials. Remove all stones over one inch in diameter. All waste material shall be removed from the site. Rake entire area to smooth even grades as indicated on Drawings.

F. The existing topsoil on the site shall have been previously stockpiled. Provide any additional topsoil required to complete the work specified herein. (See Paragraph 2.01.B. above). Submit test analysis of any additional soil to be used and the location of the topsoil source to the Architect for approval prior to spreading.

G. Any surplus topsoil shall be removed from the site at the completion of the work.

3.02 SEED AND SOD BED PREPARATION

A. Topsoil from the site and topsoil furnished shall be tested for acidity and fertility by a recognized testing agency and limestone added in sufficient quantity to bring the acidity to pH 6.5. Superphosphate shall be applied at the rate of 20 pounds per 1000 square feet. Cost of all testing shall be borne by the Contractor.

B. Commercial fertilizer shall be applied at the rate of 25 pounds per 1000 square feet or more as recommended by the testing agency. The fertilizers shall be immediately applied to the lawn area by mechanical distributor and thoroughly and evenly incorporated with the soil to a depth of three inches by discing or other approved method. In areas inaccessible to power equipment, it shall be incorporated with the soil by hand tools.

C. Seeding may be done immediately thereafter, provided the bed has remained in good, friable condition and has not become muddy or hard. If it has become hard it shall be tilled to a friable condition again.

3.03 SEEDING AND SODDING OPERATIONS

A. Seeding shall be done between April 1 to June 15 or August 15 to October 1, except for reseeding of bare spots and maintenance requirements as specified herein.

B. All disturbed areas not covered by buildings, paving or areas that have not been otherwise developed shall be seeded or sodded.

C. Seeding shall not be done during windy weather.

D. Seeding shall be done in two directions at right angles to each other.

E. Lawn areas shall be seeded by sowing evenly with an approved mechanical seeder at the rate of five pounds per 1000 square feet. Culti-packer or approved similar equipment may be used to cover the seed and to form the seed bed in one operation. In areas inaccessible to culti-packer, the seeded ground shall be lightly raked with flexible rakes and rolled with a water ballast roller.

F. The Contractor may, at his option, sod those areas scheduled for seeding to achieve immediate coverage in all areas to be seeded. All drainage swales shall be sodded on both sides to a distance of four feet from the centerline of the swale. For the purposes of this Specification, a drainage swale is a lawn area that collects water into a channeled flow and is subject to erosion.

G. Laying Sod: After preparation of base as specified herein under seed bed preparation, lay the sod in areas noted on plan, on a firm base free of lumps, footprints or other depressions. Lay successive courses so that the joints between the individual sod pieces do not coincide. Tamp the sod lightly to ensure good contact with the soil surface. When laying is completed, the surface should be top dressed lightly with screened loam free of any material larger than 1/2 inch, which shall be worked into the seams between the pieces with a brush or mat. When finished, the sod should present a smooth and uniform surface parallel to finish grade. Water immediately after completion of sodding.

H. In areas having slopes of 5:1 or steeper the Contractor shall carry out a separate overseeding operation immediately after sowing of the specified seed mix with Annual Ryegrass. This mixture shall be sown at the rate of three pounds per 1000 square feet. All areas seeded with this mixture that require additional erosion control shall be covered with an approved erosion netting properly anchored. This netting shall be removed after an acceptable stand of grass, as specified, has been achieved.

I. Hydroseeding may be used as an alternate method of seeding. The application of limestone as necessary, fertilizer and grass seed may be accomplished in one operation by the use of an approved spraying machine. The materials shall be mixed with water in the machine and shall conform to relative requirements of Section 765.65 of Mass. DPW Standard Specifications for Highways and Bridges.

3.04 GENERAL

A. All areas within the Limit of Work lines not required to be otherwise developed shall be seeded or sodded as shown in the Contract Documents. The Contractor shall restore all lawn areas disturbed because of this Contract with specified loam and seed or sod, as directed by Owner, whether within or outside the Limit of Work line.

3.05 MAINTENANCE AND PROTECTION

A. Maintenance of grass areas shall consist of watering, weeding, fertilizing, cutting and reseeding as necessary.

B. Maintenance shall also include all temporary protection fences, barriers and signs and all other work incidental to proper maintenance.

C. The Contractor shall be held responsible for maintenance of lawns, including watering, weeding, mowing, fertilizing and replanting as necessary to establish a uniform stand of the specified grasses until acceptance. Scattered bare spots, none of which are larger than 72 square inches, will be allowed up to a maximum of two percent of any lawn area. After the grass has started, all areas and parts of areas which fail to show a uniform stand of grass, for any reason whatsoever, shall be reseeded and such areas and parts of areas shall be reseeded repeatedly until all areas are covered with a satisfactory growth of grass. Sodded areas shall show no joints or bare spots, and shall show good root growth extending into the topsoil below the sod prior to acceptance. At time of first cutting keep mower blades not less than 2-1/2 inches high. All lawns shall receive at least three mowings before acceptance and shall be maintained until final acceptance by the Owner.

D. Watering: The Contractor shall include in his base bid costs for daily and, if necessary, continuous watering of all grass areas during a normal eight hour working day to maintain the seed bed in a continuous moist condition satisfactory for good germination and growth of grass as specified herein. If the grass areas are not watered as described herein, it shall constitute grounds for reduction of the base bid price submitted by the Lawn Subcontractor. Grass areas must be watered in this manner before acceptance.

E. Immediately following the second mowing, a proper, complete fertilizer shall be applied over the entire lawn area at the rate of ten pounds per 1000 square feet.

F. Full and complete written instructions for maintenance of the landscaping are to be furnished to the Architect for distribution to the Owner at least ten days prior to the end of the contractual maintenance period in order to familiarize him with the maintenance requirements for proper care and development of the plantings.

3.06 INSPECTION AND ACCEPTANCE

A. The Architect shall inspect the lawns upon written request by the Contractor. The request shall be received at least ten days before the anticipated date of inspection.

B. Inspection and acceptance of lawn areas may be requested and granted in part, provided the area for which acceptance is requested is relatively substantial in size and reasonably regular in shape with clearly definable boundaries.

C. If the grass is in satisfactory condition, the Contractor's care and maintenance responsibility will end. If grass stand is unsatisfactory, the Contractor's maintenance responsibility shall continue (including watering, weeding, fertilizing, reseeding and mowing) until an acceptable stand of grass is achieved as specified herein.

END OF SECTION

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