

Envelope Replacement

Maintenance Building

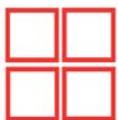
Green Hill Park

Worcester, MA

June 22, 2020



DOCUMENTS PREPARED BY



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SECTION 00.01.00

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SECTION 01.11.00

SUMMARY OF WORK

I PART 1 - GENERAL

1.01 GENERAL PROVISIONS

- A. This section supplements the Conditions of the Contract, Prime Requirements, Drawings, and all other parts of the Contract Documents.
- B. This Contractor must be familiar with all other Divisions and Sections of the Specifications which affect the work of this Section.

1.02 REQUIREMENTS INCLUDED

- A. Work under this Contract.
- B. Examination of Site and Documents.
- C. Contract Method.
- D. Work Sequence.
- E. Supervision of Work.
- F. Prime Contractor's Use of Premises.
- G. Coordination.
- H. Project Meetings.
- I. Permits, Inspection, and Testing Required by Governing Authorities.
- J. Cutting, Coring, Patching, Unless Otherwise Indicated.
- K. Debris Removal.
- L. Field Measurements.
- M. Safety Regulations.
- N. OSHA Safety and Health Course Documentation.
- O. Damage Responsibility.
- P. Owner Furnished Products.
- Q. Asbestos and Hazardous Materials Discovery.
- R. Special Requirements.
- S. List of Drawings.

1.03 WORK UNDER THIS CONTRACT

- A. The work to be done under this contract consists of executing and completing all work required for the Envelope Replacement at the Maintenance Buildings at Green Hill Park, for the City of Worcester DPW and Parks Department.
- B. For this project, the Prime Contractor shall be a contractor certified by DCAMM in the category of General Construction, as a Prime Contractor.
- C. The scope of work, without limiting the generality thereof, includes all labor, materials, equipment and services required to perform the work described fully in the Drawings and Specifications and includes, but is not limited to the following major work:
 - 1. Remove select existing siding, salvage for reinstallation in other areas.
 - 2. Install new siding at select areas.
 - 3. Replacement / sistering of existing damage framing / wood floor members.
 - 4. Removal of existing damaged ceiling / wall board and replacement.
 - 5. Replacement of select ceiling light fixtures.
 - 6. Replacement of select broken window panes and associated abatement
 - 7. Prep and paint new and existing exterior elements and select interior finishes.

8. New exhaust fan.
- D. The following major elements will be performed by the Owner, under separate contracts, for which the Prime Contractor has a coordinating responsibility:
 1. None.
- E. The following major elements will be furnished by the Owner, for installation by the Contractor or sub-contractors:
 1. None. The Contractor shall furnish all elements required for the Work.
- F. Reference to Drawings: The work to be done under this Contract is shown on the Drawings listed at the end of this Section.
- G. Prevailing Wage: The Massachusetts Standard Labor Wage rates, as outlined in the exhibits, will be used in the construction of this project

1.04 EXAMINATION OF SITE AND DOCUMENTS

- A. A pre-bid meeting will be held at the job site on the date and at the time indicated in the Invitation to Bid.
- B. Bidders may also visit the site on a non-holiday weekday acceptable to the Owner, between the hours of 9:00 AM and 3:00 PM to visually inspect the location of the work and existing conditions that may affect new work.
- C. The bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which the work is to be carried out. The Owner and Designers will not be responsible for errors, omissions, and/or charges for extra work arising from the Prime Contractor's or Subcontractor's failure to familiarize themselves with the contract documents. The Prime Contractor and Subcontractors acknowledge that they are familiar with the conditions and requirements of the contract documents where they require, in any part of the work a given result to be produced, and that the contract documents are adequate and will produce the required results.

1.05 CONTRACT METHOD

- A. Work under this contract shall be lump sum price, for the scopes of work as described in these specifications and shown on the Drawings.

1.06 WORK SEQUENCE

- A. The Work will be conducted in the following sequence of demolition/construction:
 1. Actual sequence of the work will be left to the discretion of the Contractor, who will prepare a construction schedule showing the sequence and duration of work, for review and approval by the Owner.

1.07 SUPERVISION OF WORK

- A. The Prime Contractor shall be held directly responsible for the correct installation of all work performed under this Contract. The Prime Contractor must make good repair, without expense to the Owner, of any part of the new work, or existing work to remain, which may become inoperative on account of leaving the work unprotected or unsupervised during construction of the system or which may break or give out in any manner by reason of poor workmanship, defective materials or any lack of space to allow for expansion and contraction of the work during the Prime Contractor's warranty period, from the date of final acceptance of the work by the Owner.

- B. The Prime Contractor shall furnish a competent Massachusetts licensed superintendent satisfactory to the Owner and to the Designer. The licensed superintendent shall supervise all work under this contract and who shall remain on duty at the site throughout the Contract period while work is in progress.
 - 1. Submit the name and resume of the superintendent for approval to the Architect. Include experience with projects of equal size and complexity.

1.08 PRIME CONTRACTOR'S USE OF PREMISES

- A. Use of the Site: Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.
 - 1. Owner Occupancy: Allow for Owner occupancy and use by the public (if applicable).
 - 2. Driveways and Entrances: Keep driveways and entrances serving the premises clear and available to the Owner, the Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- B. Schedule and perform work to afford minimum of interruption to normal and continuous operation of utility systems. Submit for approval, a proposed schedule for performing work; including construction of new utilities, re-routing of existing utilities and final connection of new work to existing work. Schedule shall indicate shutdown time required for each operation.
- C. The Prime Contractor shall schedule as per Section 01.50.00 - Temporary Facilities and Controls, the shutting down or interrupting any utilities, services or facilities which may affect the operation of the building outside the area of work or other buildings, services or facilities.
- D. The Prime Contractor can gain access to the premises during the hours specified below. In addition the Prime Contractor and his personnel will limit themselves only within the working premises during working hours. If work needs to be scheduled during times other than those listed below, Prime Contractor shall inform the Owner one week prior to work.
 - 1. Deliveries: 7:00 AM to 6:00 PM.
 - 2. Work on site: 8:00 AM to 4:00 PM
 - 3. Weekends: with Owner's approval
 - 4. Holidays: with Owner's approval
- E. The Prime Contractor shall verify that Subcontractors have visited the site and included all costs associated with the location of the project, and any restriction or limitations the location of the project may pose.
- F. All contractors shall at all times conduct their operations in a courteous, professional manner while on the project or in the vicinity of the project. Harassment, offensive language or behavior will not be permitted on the site.
- G. The Owner can neither accept nor assume responsibility for the security of the Contractor's material or equipment which is lost, stolen or vandalized. The Contractor is advised to exert caution in placement and storage of his equipment and material.
- H. Parking: Contractors will be allowed to park on site, where directed by the Owner. Contractor vehicles shall not block the use of the building by the Owner.
- I. Radios, tape players, "boom boxes", or other audio entertainment equipment, including personal entertainment devices, shall not be allowed on the project site.

- J. The Contractor shall not permit smoking within the building. Locate smoking areas away from entries, outdoor intakes, and operable windows, including adjacent buildings.
- K. The Contractor shall not allow the use of intoxicating beverages or non-prescription controlled substance drugs upon or about the work site.
- L. The Contractor shall provide and maintain in good serviceable condition at all times, warning signs and non-combustible barriers, forms and fire resistive tarps or plastic, each of which shall be approved by the Owner, shall be suitable for the purpose, and shall be installed adjacent to each work area, for complete enclosure and/or isolation of all excavations, wells, pits, manholes, shafts, overhead areas, etc., which are associated with the work under the contract. Barriers shall be a secure fence, guardrail, cover, or similar assembly designed and erected to provide protection for concrete, protection from the weather, and to prevent accidental access. Barrier tape and/or sawhorses shall not be used as a means of such access protection.

1.09 COORDINATION

- A. The Prime Contractor shall be responsible for the proper fitting of all the work and for the coordination of the operations of all Subcontractors or material and persons engaged upon the work. The Prime Contractor shall do, or cause his agents to do, all cutting, fitting, adjusting, and repair necessary in order to make the several parts of the work come together properly.
 - 1. Examine Contract Documents in advance of start of construction and identify in writing questions, irregularities or interference to the designer in writing. Failure to identify and address such issues in advance becomes the sole responsibility of the Prime Contractor. A conflict that would cause the reduction of the normal ceiling height of any occupied space is considered to be an interference.
- B. Execute the work in an orderly and careful manner with due regard to the occupants of the facility, the public, the employees, and the normal function of the facility.
- C. The work sequence shall follow planning and schedule established by the Prime Contractor as approved by the Designer and the Owner. The work upon the site of the project shall commence promptly and be executed with full simultaneous progress. Work operations which require the interruption of utilities, service, and access shall be scheduled so as to involve minimum disruption and inconvenience, and to be expedited so as to insure minimum duration of any periods of disruption or inconvenience.
- D. The Prime Contractor shall review the tolerances established in the specifications for each type of work and as established by Subcontractor organizations. The Prime Contractor shall coordinate the various Subcontractors and resolve any conflicts that may exist between Subcontractor tolerances without additional cost to the Owner. The Prime Contractor shall provide any chipping, leveling, shoring or surveys to ensure that the various materials align as detailed by the Designer and as necessary for smooth transitions not noticeable in the finished work.

1.10 PROJECT MEETINGS

- A. Project meetings shall be held on a weekly basis and as required subject to the discretion of the Owner.
- B. Attendees: In addition to the Project Manager and Designer, each contractor, subcontractor, supplier, and 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 Project and authorized to conclude matters relating to the Work.
- C. In order to expedite construction progress on this project, the Prime Contractor shall order all materials immediately after the approval of shop drawings / submittals and shall obtain a fixed date of delivery to the project site for all materials ordered which shall not impede or otherwise interfere with construction progress. The Prime Contractor shall present a list and written proof of all materials and equipment ordered

(through purchase orders). Such list shall be presented at the meetings and shall be continuously updated.

- D. Scheduling shall be discussed with all concerned parties, and methods shall be presented by the Prime Contractor, which shall reflect construction completion not being deferred or foreshortened. Identify critical long-lead items and other special scheduling requirements. The project schedule is to include time for submission of shop drawing submittals, time for review, and allowance for resubmittal and review.

1.11 PERMITS, INSPECTION, AND TESTING REQUIRED BY GOVERNING AUTHORITIES

- A. If the Contract Documents, laws, ordinances, rules, regulations or orders of any public authority having any jurisdiction require any portion of the Work to be inspected, tested, or approved, the Prime Contractor shall give the Designer, the Owner or his/her designated representative, and such Authority timely notice (5 business days minimum) of its readiness so the Designer may observe such inspecting, testing, or approval.
- B. Prior to the start of construction, the Prime Contractor shall complete application to the applicable Building Code enforcement authority for a Building Permit. Such Permit shall be displayed in a conspicuous location at the project site. The building permit fee shall be paid by the Contractor.
- C. Unless otherwise specified under the Sections of the Specifications, the Prime Contractor shall pay such proper and legal fees to public officers and others as may be necessary for the due and faithful performance of the work and which may arise incidental to the fulfilling of this Contract. As such, all fees, charges, and assessments in connection with the above shall be paid by the Prime Contractor.
- D. Prime Contractor and specialized Subcontractors as applicable shall identify all permits (other than Prime building permit) required from Authorities having jurisdiction over the Project for the construction and occupancy of the work. The Prime Contractor shall prepare the necessary applications and submit required plans and documents to obtain such permits in a timely manner, and shall furnish the required information to the Building Official and obtain the required permits as early as practicable after award of the Contract.
- E. Prior to the start of construction, the Prime Contractor shall complete applicable applications, permits, and notifications to the MADEP, such as the Demolition/Construction form BWP AQ-06, and pay the required fees. These forms must be submitted at least 10 working days in advance of any regulated activity on the site. Demolition permits must be submitted for any work involving demolition, new construction and renovation.

1.12 CUTTING, CORING, AND PATCHING, UNLESS OTHERWISE INDICATED

- A. The Prime Contractor shall perform and/or coordinate all cutting, coring, fitting and patching of the work as specified in Section 01.73.29 – Cutting and Patching.
- B. The Prime Contractor shall coordinate that the work of the Subcontractor is not endangered by any cutting, coring, excavating, or otherwise altering of the work and shall not allow the cutting or altering the work of any Subcontractor except with the written consent of the Designer.
- C. Performance:
 - 1. Execute cutting and patching by methods which will prevent damage to other work, and will provide proper surfaces to receive installation of repairs.
 - (a) In general, where mechanical cutting is required, cut work with sawing and grinding tools, not with hammering and chopping tools. Core drill openings through concrete work.
 - (b) Prior to cutting and structural steel or concrete work, contact Designer and Project Structural Engineer in writing. Do not cut any structural steel and concrete work until approval has been granted by the Designer and the Project Structural Engineer.

2. Employ original installer or fabricator to perform cutting and patching for:
 - (a) Weather-exposed or moisture-resistant elements.
 - (b) Sight-exposed finished surfaces.
3. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes.
4. Restore work which has been cut or removed; install new products matching existing to provide completed Work in accordance with requirements of Contract Documents.
5. Fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
6. Patch with seams which are durable and as invisible as possible. Flash and seal all penetration of exterior work. Comply with specified tolerances for the work.
7. Restore exposed finishes of patched areas; and, where necessary extend finish restoration onto retained work adjoining, in a manner which will eliminate evidence of patching.
 - (a) Where patch occurs in a smooth painted surface, extend final paint coat over the entire unbroken surface containing the patch.
8. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes:
 - (a) For continuous surfaces, refinish to nearest intersection.
 - (b) For an assembly, refinish entire unit.

D. Existing Utilities Services:

1. Interruptions to critical existing utility services will not be allowed except as scheduled per Section 01.50.00 - Temporary Facilities and Controls.
2. The Prime Contractor shall locate and record on Drawings all existing utilities along the course of the work by such means as the Designer and the Owner may approve, and shall preserve such marked locations until the work has progressed to the point where the encountered utility is fully exposed and protected as required. It shall be the Prime Contractor's responsibility to notify the proper authorities and/or utility company before interfering therewith.
3. Existing utilities that are indicated on the Drawings or whose locations are made known to the Prime Contractor prior to excavations, though accuracy and information as to grades and elevations may be lacking, shall be protected from damage during the excavation and backfilling operations and, if damaged by the Prime Contractor, it shall be repaired by the Prime Contractor at his/her own expense.
4. All exposed conduits, wires, and/or cables shall be provided with sufficient protection and support to prevent failure, fraying, or damage due to backfilling or other construction operations.

1.13 DEBRIS REMOVAL

- A. The Prime Contractor shall coordinate the removal of all demolition and construction waste including waste by all Subcontractors from the job site on a daily basis.
- B. Debris shall be legally disposed of in a D.E.P. approved disposal site.
- C. Contractors are advised that the project site is within an Asian Longhorn Beetle district. All vegetative waste and debris shall be disposed of at an approved Asian Longhorn Beetle site.

- D. The Prime Contractor shall bear responsibility for maintaining the building and site clean and free of debris, leaving all work in clean and proper condition satisfactory to the Owner and the Designer. The Prime Contractor shall ensure that each of the Subcontractors clean up during and immediately upon completion of their work. Clean up includes the following tasks:
 - 1. Remove all rubbish, waste, tools, equipment, appurtenances caused by and used in the execution of work.
- E. Prevent the accumulation of debris at the construction site, storage areas, parking areas, and along access roads and haul routes.
- F. Provide containers for deposit of debris and schedule periodic collection and disposal of debris.
- G. Prohibit overloading of trucks to prevent spillage on access and haul routes.
- H. The Prime Contractor shall be responsible for proper disposal of all construction debris leaving the site.

1.14 FIELD MEASUREMENTS

- A. Although care has been taken to ensure their accuracy, the dimensions shown for existing items and structures are not guaranteed. It is the responsibility of the Prime Contractor to verify these dimensions in the field before fabricating any construction component. No claims for extra payment due to incorrect dimensions will be considered by the Owner.

1.15 SAFETY REGULATIONS

- A. This project is subject to compliance with Public Law 91 596 "Occupational Safety and Health Act" latest edition (OSHA 29 CFR 1926), with respect to all rules and regulations pertaining to construction, including Volume 36, numbers 75 and 105, of the Federal Register, as amended, and as published by the U.S. Department of Labor.
- B. Hazardous Waste Generation: Any work generating Hazardous or so-called Universal Wastes will comply with all requirements of 310 CMR 30.000. The proper storage, use and disposal of any hazardous chemicals or substances brought on site by the Contractor are the responsibility of Contractor. The Owner will not be responsible for any hazardous materials left on site, the cost to remove these materials will be the Contractor's responsibility. All hazardous wastes generated as a result of demolition and remodeling shall be contained, collected, segregated, labeled per all applicable federal EPA, Massachusetts DEP, and Federal DOT regulations or other applicable local, state or federal hazardous waste regulations, pending the appropriate disposition.

1.16 OSHA SAFETY AND HEALTH COURSE DOCUMENTATION

- A. OSHA Safety and Health Course Documentation Records: Chapter 306 of the Massachusetts Acts of 2004 requires that everyone employed at the jobsite must complete a minimum 10-hour long course in construction safety and health approved by the U.S. Occupational Safety and Health Administration (OSHA) prior to working at the jobsite. Compliance is required of Prime Contractors' and Subcontractors' on-site employees at all levels whether stationed in the trailer or working in the field. Unless the Massachusetts Attorney General's office indicates otherwise, this requirement does not apply to home-office employees visiting the site or to suppliers' employees who are making deliveries.
- B. OSHA 10 cards for anyone working on site are to be submitted prior to the first requisition.
- C. Documentation records shall be initially compiled by the Prime Contractor and Subcontractors, and the Prime Contractor shall create and maintain a copy of the documentation on site at all times.

1.17 DAMAGE RESPONSIBILITY

- A. The Prime Contractor shall repair, at no cost to the Owner, any damage to building elements, site appurtenances, landscaping, utilities, etc. caused during demolition operation and work of this Contract.

1.18 OWNER FURNISHED PRODUCTS

- A. Products indicated "N.I.C." (Not in Contract), or "E. O." (Equipment by Owner), or "O.F.O.I." (Owner Furnished Owner Installed), or other similar acronyms as defined in the contract documents will be furnished and installed by the Owner. Coordination and provision of service lines for such products shall be included under these Construction Contract Documents, if indicated. Final connections from service lines to equipment will be by the Owner, unless otherwise indicated

1.19 ASBESTOS AND HAZARDOUS MATERIALS DISCOVERY

- A. If unanticipated asbestos-containing materials or other Hazardous Materials not included in Contract are discovered at any time during the course of work, the Prime Contractor shall cease work in the affected areas only and continue work in other areas, at the same time notify the Designer of such discovery. Do not proceed with work in such affected areas until written instructions are received. If removal is required, payment will be made in accordance with the contract unit prices bid for each respective material. In the absence of unit prices, costs shall be negotiated or otherwise established prior to commencement of removal, in accordance with provisions of the Contract.
- B. The Owner or Designer will work with the Contractor to initiate removal or encapsulation of the asbestos. An extension of the completion date may be granted equal to the time lost. Proper notification must be made to the MADEP through the ANF-001 form, and the Owner.

1.20 LIST OF DRAWINGS

T1 - COVER SHEET

A1 - MAINTENANCE BUILDING PLANS, ELEVATIONS AND DETAILS

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

**END OF SECTION
01.11.00**

SECTION 01.22.00

UNIT PRICES

I. PART I - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Unit pricing shall be performed by the General Contractor and/or Sub-Contractor as applicable.
- B. Unit price work will be paid for in accordance with unit prices listed by the General Contractor, based on estimated quantities calculated by the Designer.
- C. All unit prices shall include their pro-rata share of all costs for overhead, profit, bond, labor, materials, disposal, and equipment to perform the work item complete, as identified.
- D. Unit Price Proposal Sheets shall be included with Sub-Contractor form for bid when applicable.
- E. The total amount of all unit price work shall be included in the amount to be entered in applicable bid forms.
- F. Unit Prices shall provide for a variance in quantities of plus or minus 100 percent of those listed on the Unit Price Proposal Sheet.
- G. If quantities exceed the units established in the contract, including the aforesaid overage percentage, an equitable unit price adjustment will be determined by the unit prices contained herein.
- H. A change order will be initiated by the General Contractor to adjust the contract price resulting from the final quantities of the unit price work.

1.02 UNIT PRICES

- A. Should certain additional work be required, or should the quantities of certain classes of work be increased or decreased from those required by the Contract Documents, by authorization of the Owner, the below unit prices shall, at the option of the Owner, 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 or increases) or to be refunded (in the case of decreases). No additional adjustment will be allowed for overhead, profit, insurance, or other direct or indirect expenses of the General Contractor or Non Sub-Contractors. No additional adjustments will be allowed for over excavation, over-blasting, or other work without the prior written approval of the Designers. **The square footages included in the table below and the Unit Price sheet is above and beyond the quantities shown on the drawings and are to be applied to unforeseen conditions.**

	Item Description	Quantity
1.	Remove existing and install new cedar siding.	200 sf
2.	Remove existing wood 1 x 6" trim and replace in kind.	50 lf
3.	Remove damaged exterior wall sheathing and replace in kind.	200 sf
4.	Remove damaged floor sheathing and underlayment and replace in kind.	150 sf
5.	Remove damaged wall framing and replace in kind (2"x4").	75 lf
6.	Remove damaged floor framing and replace in kind (2"X12").	120 lf
7.	Remove existing wall / ceiling board and replace in kind, fill and tape.	125 sf
8.	Remove and replace broken window panes (Including abatement).	2 ea

II. PRODUCTS (Not Used)

III. EXECUTION (Not Used)

END OF SECTION

UNIT PRICE FORM

- A. The following unit prices as defined in the specifications are designated for items of work on the basis of quantities estimated by the Designer. These unit prices will be used to add to or deduct from the dollar amounts shown, depending on whether the actual amount is greater or less than the estimated amount.
- B. Bidders shall include this form with the Bid.

Section	Item	Base Bid Unit Price Quantity	Unit Measure	Unit Price	Total Price
07.20.00	Remove existing and install new cedar siding	200 sf	Square footage	\$_____	\$_____
07.20.00	Remove existing wood 1x6" trim and replace in kind	50 lf	linear foot	\$_____	\$_____
06.10.00	Remove damaged exterior wall sheathing and replace in kind	200 sf	square foot	\$_____	\$_____
06.10.00	Remove damaged floor sheathing and underlayment and replace in kind	150 sf	square foot	\$_____	\$_____
06.10.00	Remove damaged wall framing and replace in kind (2x4")	75 lf	square foot	\$_____	\$_____
06.10.00	Remove damaged floor framing and replace in kind (2x12")	120 lf	square foot	\$_____	\$_____
09.21.16	Remove existing wall / ceiling board and replace in kind, fill and tape.	75 sf	square foot	\$_____	\$_____
02.80.00 / 08.62.10	Remove and replace broken window panes (including abatement).	2 ea	ea	\$_____	\$_____
				TOTAL	\$_____

- The unit prices as requested herein shall include their pro-rata share of all costs for overhead, profit, bond, labor, materials and equipment costs and all other work incidental thereto, including disposal of materials.
- Any unit price proposal that contains a unit price which is unduly high or low may be rejected as unbalanced, and thereby affect the total cost proposal of this contract.

3. Unit price proposal sheets must be submitted with the respective pre-qualified Sub-Contractor - bid form as applicable.
4. The total amount above shall be included in the amount to be entered in Paragraph D Item 1 - Work of the Prime Contractor.

SECTION 01.31.00

PROJECT MANAGEMENT AND COORDINATION

I. PART I - 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.

1.02 SUMMARY

- A. Without limitations, coordination will include Critical Path Method Scheduling (CPM), coordination of submittals, coordination of all elements of the Work, and coordination of contract closeout.
- B. Description:
 - 1. Coordinate scheduling, submittals, and work of the various trades and elements of the Work to assure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items to be installed later.
 - 2. Coordinate sequence of the Work to accommodate Partial (Beneficial) Occupancy.
- C. Meetings:
 - 1. In addition to progress meetings, hold coordination meetings and pre-installation conferences with personnel and Sub-Contractors to assure coordination of the Work. The coordination meetings are to be separate from the commissioning or commissioning meetings.
- D. Coordination of Submittals:
 - 1. Schedule and coordinate submittals.
 - 2. Coordinate work of various trades having interdependent responsibilities for installing, connecting to, and placing in service such equipment.
 - 3. Coordinate requests for substitutions to assure compatibility of space, of operating elements, and effect on work of other trades.
 - 4. Contractor's mark-up will be excluded from change orders caused by lack of coordination during design.
- E. Commissioning:
 - 1. Not applicable.

1.03 FIELD COORDINATION

- A. Project scopes of limited complexity or limited utility installation will not require coordination drawings. The Prime Contractor remains responsible for field coordinating the work of all trades, to see that it comes together without conflict or loss of functionality.
 - 1. Where field coordination is performed, the Prime Contractor shall advise the Designers of any conflict or field condition which results in the system being installed other than as designed.
 - 2. In such instances, contractors are expected to propose alternative routes based on field conditions

revealed through the performance of the demolition. Rerouting shall not be performed, however, until first approved by the Designers. No additional compensation will be due for field coordination efforts.

3. Where rerouting of utilities differently than designed creates a conflict with another trade, which was not foreseen or properly coordinated between the contractors, the conflicting utility shall be revised at no expense to the Owner, to eliminate the conflict.

1.04 MEP COORDINATION DRAWINGS

- A. Not applicable.

II. PRODUCTS (Not Used)

III. EXECUTION (Not Used)

END OF SECTION

SECTION 01.32.00

CONSTRUCTION PROGRESS DOCUMENTATION

I. PART I - 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.

1.02 REQUIREMENTS INCLUDED

- A. Procedures and requirements for submission and review of progress schedules and reports.

1.03 RELATED SECTIONS

- A. Section 01.10.00 – SUMMARY
 - 1. Project meetings.
- B. Section 01.31.00 - PROJECT MANAGEMENT AND COORDINATION
 - 1. Progress and coordination meetings.
- C. Section 01.33.00 - SUBMITTAL REQUIREMENTS
 - 1. Project reports.
 - 2. Schedule of values.
 - 3. Shop drawings, product data, and samples.

1.04 CONSTRUCTION SCHEDULE

- A. Prime Contractor shall prepare and submit for Designer and Owner's information, a Critical Path Method (CPM) Progress Schedule for the work of the project. Said schedule will be coordinated with the Designer's Work Plan to include sequencing of the project work and shall be submitted within 2 weeks of pre-construction meeting.
- B. In addition, the Prime Contractor shall prepare and submit at each project meeting, a two- week look-ahead schedule. The schedule shall identify:
 - 1. Major elements of the work which were complete since the last project meeting, organized by room or by trade.
 - 2. Major elements of the work to be performed in the next two weeks, to be able to track short-term conformance to the overall project schedule.
 - 3. A projection of any upcoming required service interruption notices

1.05 CRITICAL PATH METHOD SCHEDULING

- A. The Prime Contractor remains responsible for identifying the critical path of all project activities and milestones, and will not be entitled to any additional compensation or any additional days related to Change Order work unless it can be demonstrated that latent conditions impact the critical path.
- B. The critical path schedule shall be updated and resubmitted with each Application for Payment, and shall be

considered a prerequisite for payment.

C. Additional Requirements

1. Provide a list of all items requiring submittal, their lead time, and the date by which submittal approval is required in order for the materials to on site at the required time.

II. PRODUCTS (Not Used)

III. EXECUTION (Not Used)

END OF SECTION

SECTION 01.33.00

SUBMITTALS

I. 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.

1.02 RELATED DOCUMENTS

- A. This Section supplements the General Conditions.
- B. Consult the individual sections of the specifications for the specific submittals required under those sections and for further details and descriptions of the requirements

1.03 GENERAL PROCEDURES FOR SUBMITTALS

- A. Timeliness - The Contractor shall transmit each submittal to the Architect sufficiently in advance of performing related Work or other applicable activities so that the installation is not delayed by processing times, including disapproval and resubmittal (if required), coordination with other submittals, testing, purchasing, fabrication, delivery, and similar sequenced activities. No extension of time will be authorized because of the Contractor's failure to transmit submittals to the Architect in advance of the Work.
 - 1. Allow 10 business days for the Architect's review of submittals.
- B. Sequence - The Contractor shall transmit each submittal in a sequence which will not result in the Architect's approval having to be later modified or rescinded by reason of subsequent submittals which should have been processed earlier or concurrently for coordination.
- C. Contractor's Review and Approval - Only submittals received from and bearing the stamp of approval of the Contractor will be considered for review by the Architect. Submittals shall be accompanied by a transmittal notice stating name of Project, date of submittal, "To", "From" (Contractor, Subcontractor, Installer, Manufacturer, Supplier), Specification Section, or Drawing No. to which the submittal refers, purpose (first submittal, resubmittal), description, remarks, distribution record, and signature of transmitter.
- D. Architect's Action - The Architect will review the Contractor's submittals and return them with one of the following actions recorded thereon by appropriate markings:
 - 1. Final Unrestricted Release: Where marked "No Exceptions Taken" the Work covered by the submittal may proceed provided it complies with the requirements of the Contract Documents.
 - 2. Final-But-Restricted Release: When marked "Note Markings" or "Comments Attached" the Work may proceed provided it complies with the Architect's notations or corrections on the submittal and complies with the requirements of the Contract Documents. Acceptance of the Work will depend on these compliances.
 - 3. Returned for Resubmittal: When marked "Resubmit" or "Rejected" the Work covered by the submittal (such as purchasing, fabrication, delivery, or other activity) should not proceed. The submittal should be revised or a new submittal resubmitted without delay, in accordance with the Architect's notations stating the reasons for returning the submittal.
- E. Processing - All costs for printing, preparing, packaging, submitting, resubmitting, and mailing, or delivering submittals required by this contract shall be included in the Contract Sum.

1.04 OR EQUALS

- A. Definition - Whenever a specification section names one or more brands for a given item, and the Contractor wishes to submit, for consideration, another brand, the submission shall be considered an "or-equal" or a "material substitution". For the purposes of this Contract, the terms "or-equal" and "material substitution" shall be considered synonymous.
- B. In no case may an item be furnished on the Work other than the item named or described, unless the Architect, with the Owner's written concurrence, shall consider the item equal to the Item so named or described.
- C. The equality of items offered as "equal" to items named or described shall be proved to the satisfaction of the Architect at the expense of the Contractor submitting the substitution.

1.05 SUBMISSION OF PRODUCT DATA

- A. The Contractor shall submit an electronic copy of Product Data, in Adobe Acrobat (pdf) format to the Architect. All such data shall be specific and identification of material or equipment submitted shall be clearly marked or highlighted. Data of general nature will not be accepted.
- B. Product Data shall be accompanied by a transmittal notice. The Contractor's stamp of approval shall appear on the printed information itself, in a location which will not impair legibility.
- C. Product Data returned by the Architect as "Rejected" shall be resubmitted until the Architect's approval is obtained.
- D. When the Product Data are acceptable, the Architect will stamp them "No Exceptions Taken", and return 1 copy to the Contractor. The Contractor shall provide and distribute additional copies as may be required to complete the Work.
- E. The Contractor shall maintain one full set of approved, original, Product Data at the site.

1.06 SUBMISSION OF SHOP DRAWINGS

- A. Shop Drawings shall be complete, giving all information necessary or requested in the individual section of the specifications. They shall also show adjoining Work and details of connection thereto.
- B. Shop Drawings shall be for whole systems. Partial submissions will not be accepted.
- C. The Architect reserves the right to review and approve shop drawings only after approval of related product data and samples.
- D. Shop drawings shall be properly identified and contain the name of the project, name of the firm submitting the shop drawings, shop drawing number, date of shop drawings and revisions, Contractor's stamp of approval, and sufficient spaces near the title block for the Architect's stamp.
- E. The Contractor shall submit to the Architect three (3) black line prints of each shop drawing or one electronic copy in Adobe Acrobat (pdf) format, at the Architect's discretion. Prints may be mailed, delivered in roll form or emailed. Each submittal shall be accompanied by a transmittal notice bearing the Contractor's approval stamp.
- F. When the Architect returns a marked submittal with the stamp "Resubmit" or "Confirm", the Contractor shall correct the original drawing or prepare a new drawing and resubmit three prints or an electronic version thereof to the Architect for approval. This procedure shall be repeated until the Architect's approval is obtained.
- G. When the Architect returns submittal with the stamp "No Exceptions Taken", the Contractor shall provide and distribute the prints for all Contractor and Subcontractors use.

H. The Contractor shall maintain one full set of approved shop drawings at the site.

1.07 SUBMISSION OF SAMPLES

- A. Unless otherwise specified in the individual section, the Contractor shall submit two specimens of each sample.
- B. A transmittal notice with the Contractors stamp of approval shall be included with all sample submittals.
- C. Samples shall be of adequate size to permit proper evaluation of materials. Where variations in color or in other characteristics are to be expected, samples shall show the maximum range of variation. Materials exceeding the variation of approved samples will not be approved on the Work.
- D. Samples that can be conveniently mailed shall be sent directly to the Architect, accompanied by a transmittal notice. All transmittals shall be stamped with the Contractor's approval stamp of the material submitted.
- E. All other samples shall be delivered at the field office of the Project Representative with sample identification tag attached and properly filled in.
- F. If a sample is rejected by the Architect, a new sample shall be resubmitted in the specified manner. This procedure shall be repeated until the Architect approves the sample.
- G. Samples will not be returned unless return is requested at the time of submission. The right is reserved to require submission of samples whether or not particular mention is made in the specifications, at no additional cost to the Owner.

END OF SECTION

01.33.00

SECTION 01.50.00

TEMPORARY FACILITIES AND CONTROLS

I. PART I - 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.

1.02 REQUIREMENTS INCLUDED

- A. Temporary Facilities and Controls including the following:
 - 1. Temporary Water.
 - 2. Weather Protection.
 - 3. Heating During Construction.
 - 4. Temporary Power.
 - 5. Hoisting Equipment and Machinery.
 - 6. Staging.
 - 7. Maintenance of Access.
 - 8. Dust Control.
 - 9. Noise Control.
 - 10. Indoor Air Quality (IAQ) Management.
 - 11. Enclosures.
 - 12. Cleaning During Construction.
 - 13. Field Offices.
 - 14. Telephone Service.
 - 15. Sanitary Facilities.
 - 16. Construction Barriers.
 - 17. Parking.
 - 18. Debris Control and Removal.
 - 19. Safety Protection.
 - 20. Vehicle and Equipment Protection.
 - 21. Shoring.
 - 22. Construction Fence.
 - 23. Project Identification Sign.
 - 24. Delivery of Materials.
 - 25. Shut Down Notice.
 - 26. Construction Cores.
 - 27. Covered Walkways
 - 28. Excavations and Field Survey Requirements

1.03 TEMPORARY WATER

- A. Contractors may use water available at the site, provided for and paid for by the Owner, provided it is not used wastefully. Connections to hose bibbs or sill cocks shall be made where directed by the Owner in the field.
- B. Any temporary hoses and pipe lines and connections from the permanent service lines either outside or within the building, shall be provided by the Trade requiring the water.
- C. Temporary hoses and temporary pipe lines used for transporting water shall not be run unattended or unprotected across parking areas, parking area entrance, walkways, plazas, or steps. Temporary hoses and temporary pipelines shall not be permitted to be installed along, through or across corridor and occupied rooms or spaces.
- D. The General Contractor shall provide an adequate supply of drinking water from approved sources of acceptable

quality, satisfactorily cooled, for his employees and those of his Subcontractors.

- E. Use of the water may be discontinued by the Owner if, in their opinion, it is wastefully used.

1.04 WEATHER PROTECTION

- A. It is the intent of these Specifications to require that the General Contractor shall provide temporary enclosures and heat to permit construction work to be carried on during the months of November through March in compliance with M.G.L. Chapter 149, Section 44D(G). Under no circumstances shall the General Contractor suspend any work during the months of November through March because of their reluctance to provide and pay for temporary weather protection. These Specifications are not to be construed as requiring enclosures or heat for operations that are not economically feasible to protect in the judgment of the Designer. Included in the preceding category, without limitation, are such items as site work, excavation, steel erection, erection of certain "exterior" wall panels, roofing, and similar operations.
- B. "WEATHER PROTECTION" shall mean the temporary protection of that work adversely affected by moisture, wind, and cold, by covering, enclosing and/or heating. This protection shall provide adequate working areas during the months of November through March as determined by the Designer and consistent with the approved construction schedule to permit the continuous progress of all work necessary to maintain an orderly and efficient sequence of construction operations. The General Contractor shall furnish and install all "weather protection" material and be responsible for all costs, including heating required to maintain a minimum temperature of 50 degrees F. at the working surface, except in unheated buildings. This provision does not supersede any specific requirements for methods of construction, curing of materials or the applicable general conditions set forth in the Contract Articles with added regard to performance obligations of the General Contractor.
 - 1. Within 30 calendar days after his award of contract, the General Contractor shall submit in writing to the Designer for approval, three copies of his proposed methods for "Weather Protection."
 - 2. Installation of weather protection and heating devices shall comply with all safety regulations including provisions for adequate ventilation and fire protection devices. Heating devices which may cause damage to finish surfaces shall not be used.

1.05 HEATING DURING CONSTRUCTION

- A. The General Contractor, with the approval of the Owner, may use the permanent heating system as specified for the project.
- B. In buildings with heating systems, the General Contractor shall maintain heat therein of not less than 50 degrees F., nor more than 75 degrees F., which shall be continuously maintained in the enclosed area to the extent necessary to properly progress and protect the work until the project is accepted.
 - 1. Should heating system shutdown require temporary heating to maintain the specified temperatures, the General Contractor shall submit in writing to the Designer for approval, three copies of his method and time schedule for heating during construction.
 - 2. Costs for temporary heat shall be solely the General Contractor's.
- C. The installation and operation of heating devices shall comply with all safety regulations including provisions for adequate ventilation and fire protection. Heating devices which may cause damage to finish surfaces shall not be used.
- D. Contractors shall have qualified personnel available 7 days a week, 24 hours a day to respond to emergencies or service or check heating equipment when required, to protect the Work and the building.

1.06 TEMPORARY POWER

- A. Contractors may utilize electrical power where available in or around the Work Area, and the Owner shall pay the cost of electricity used.

1. The use of cordless tools is strongly encouraged.
 2. Contractors shall provide their own electrical cords, and cords shall not be run through or across egress components.
- B. Modification of electrical panels is not permitted, except where higher voltages are required for specialty tools. Any panel modifications may only be performed by a licensed electrician, and with the Owner's approval.
- C. Generators for temporary power will be permitted.

1.07 HOISTING EQUIPMENT AND MACHINERY

- A. All hoisting equipment and machinery required for the proper and expeditious prosecution and progress of the work shall be furnished, installed, operated and maintained in safe condition by the individual Subcontractors and is so stated in each appropriately related Section of the Specifications. All costs for hoisting operating services shall be borne by the Subcontractors unless specifically excepted in the Contract Documents.
1. A licensed equipment manufacturer's representative shall be present at all times, to witness the erection and dismantling of all hoisting equipment and machinery, whenever such equipment is being erected or dismantled. No such work will be performed without the presence of such representative.
 2. Hoisting equipment and machinery erection and dismantling shall be performed only by trained, certified, and experienced riggers qualified to perform such work.
 3. Copies of such licenses and/or certifications, clearly indicating qualifications, shall be provided to the designer prior to commencement of such erecting and dismantling work.
- B. Review Drawings for hoisting requirements and openness of traffic access routes to installed destinations of specified equipment and furnishings.

1.08 STAGING

- A. All staging, planking and scaffolding, exterior and interior, required for the proper execution of the work and over eight feet in height, shall be furnished, installed, and maintained by the Prime Contractor.
1. Erection and dismantling of staging shall be performed only by trained, certified, and experienced staging personnel qualified to perform such work.
 2. Copies of such certifications, clearly indicating qualifications, shall be provided to the Owner prior to commencement of such erecting and dismantling work.
 3. All staging up to eight feet in height shall be provided by the individual Subcontractors as applicable to their work.
 4. Use of staging extends to the Owner's contractors as may be listed in Section 01.11.00 - Summary of Work, where applicable.

1.09 MAINTENANCE OF ACCESS

- A. The Prime Contractor shall provide and maintain for the duration of his contract, a means of access to, around and within the site, as indicated on the Contract Drawings, for vehicular traffic and authorized personnel. This means of access shall be construed to sustain the weight of equipment customarily engaged for use in construction projects of this type and magnitude. The Prime Contractor shall, without additional compensation from the Owner, furnish labor and materials as may be required from time to time to maintain this means of access in an acceptable condition as determined by the Designer. Pedestrian access shall provide adequate protection against falling debris, slippage, adequate lighting, warning and directional signs, and protection against construction activities.

1.10 DUST CONTROL

- A. The Prime Contractor shall have all Subcontractors provide adequate means for the purpose of preventing dust caused by construction operations from creating a hazard, nuisance, and from entering adjacent occupied areas throughout the period of the construction contract.
- B. This provision does not supersede any specific requirements for methods of construction or applicable general conditions set forth in the Contract Articles with added regard to performance obligations of the Prime Contractor.

1.11 NOISE CONTROL

- A. Work must be scheduled and performed in such a manner as to not interfere with the operations of the Owner. Construction work that is deemed by the Owner to be excessively noisy may be required to be done during non-normal working hours and at no additional expense.
- B. Comply with requirements of authorities having jurisdiction. Develop and maintain a noise-abatement program and enforce strict discipline over all personnel to keep noise to a minimum.
- C. Execute construction work by methods and by use of equipment which will reduce excess noise.
 - 1. Equip air compressors with silencers, and power equipment with mufflers.
 - 2. Manage vehicular traffic and scheduling to reduce noise.

1.12 INDOOR AIR QUALITY (IAQ) MANAGEMENT

- A. Not applicable.

1.13 ENCLOSURES

- A. Not applicable.

1.14 CLEANING DURING CONSTRUCTION

- A. Unless otherwise specified under the various Sections of the Specifications, the General Contractor shall perform clean-up operations during construction as herein specified.
- B. Control accumulation of waste materials and rubbish; periodically dispose of off-site in a legal manner. The General Contractor shall bear all costs, including fees resulting from such disposal.
- C. Clean interior areas prior to start of finish work and maintain areas free of dust and other contaminants during finish operations.
- D. Clean all dirt and debris tracked into other buildings by construction personnel, to the satisfaction of the Owner.
- E. Maintain project in accordance with all local and Federal Regulatory Requirements.
- F. Store volatile wastes in covered metal containers, and remove from premises.
- G. Prevent accumulation of wastes which create hazardous conditions.
- H. Provide adequate ventilation during use of volatile or noxious substances.
- I. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
 - 1. Do not burn or bury rubbish and waste materials on site.
 - 2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.

3. Do not dispose of wastes into streams or waterways.
 4. Identify potential sources of cleaning water runoff and propose abatement procedures.
- J. Use only those materials which will not create hazards to health or property and which will not damage surfaces.
 - K. Use only those cleaning materials and methods recommended by manufacturer of surface materials to be cleaned.
 - L. Execute cleaning to ensure that the buildings, the sites, and adjacent properties are maintained free from accumulations of waste materials and rubbish and windblown debris, resulting from construction operations.
 - M. Provide on-site containers for collection of waste materials, debris, and rubbish.
 - N. Remove waste materials, debris and rubbish from the site periodically and dispose of at legal disposal dump site (DEP approved). Recycle where possible.
 - O. Handle material in a controlled manner with as few handlings as possible. Do not drop or throw materials from heights.
 - P. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not damage surrounding surfaces.

1.15 FIELD OFFICES

- A. Contractors may not utilize space within the project area for a field office. The Owner will not provide usable space, outside of the project area, as field offices for the contractors.
- B. If desired, the Prime Contractor may provide a suitable field office on site for its own use and at his own expense. The office trailer shall be relocated if required by the Owner, and shall be secured to the site as required by the Building Code.

1.16 TELEPHONE SERVICE

- A. Wired telephone service to the office trailer or project site is not required, although contractors may elect to have such service at their own expense.
- B. All Designers, Superintendents and Project Managers shall maintain cellular telephones and be reachable Monday - Friday between 8AM and 5PM, and after hours for emergency calls. Phone numbers shall be listed on a Project Directory, to be submitted at the pre-construction meeting.

1.17 SANITARY FACILITIES

- A. Use of toilet facilities within the building is prohibited.
- B. If an office trailer is provided, it may be equipped with toilet room containing a working chemical toilet, at the contractor's option. Trailer shall not be removed from site until at least one toilet room in new building is operational.
- C. Otherwise, the General Contractor shall provide suitable toilet facilities on site, in a location as required by the Owner. Maintain chemical toilets where work is in progress and in quantity required by OSHA Code.
- D. Chemical toilets and their maintenance shall meet requirements of state and local health regulations and ordinances and shall be subject to the approval the Owner and Designer.
- E. If the Owner allows the use of public toilet rooms on site, the General Contractor shall take responsibility for maintenance and cleaning of such areas and shall leave them in first class condition equal to the accepted conditions of toilet facilities not used for construction personnel.

1.18 CONSTRUCTION BARRIERS

- A. Proper construction barriers shall be provided around the contract work areas as defined by the Contract Drawings or as directed by the Owner.
- B. Construction barriers shall consist of traffic cones, ribbons, tapes, secure fencing, trench covers, wood barriers, warning signs, directional signs, and other traffic materials to keep traffic and people from area of construction and maintain ongoing operations.
- C. Barriers shall be erected at such approved locations as are necessary, sufficiently cross-braced and supported adequately from floors and ceilings as required.

1.19 PARKING

- A. Contractors shall park where directed by the Owner, and move vehicles when requested by the Owner.
 - 1. Access to loading docks, driveways, staff, faculty, visitor or tenant parking shall not be blocked by construction vehicles.
 - 2. Parking in handicapped accessible spaces will not be permitted.
- B. Idling of vehicles on site will not be permitted.
- C. If the Owner authorizes parking on lawns, the Prime Contractor shall be responsible for repairing any damage to lawns or curbs from parked vehicles.

1.20 DEBRIS CONTROL AND REMOVAL

- A. Debris shall not be permitted to accumulate or migrate and the work shall at all times be kept satisfactorily clean. Facility trash receptors shall not be used for the disposal of debris. Dumpster shall be provided by the General Contractor for removal of debris for all Subcontractors.
- B. Remove debris from the work site on a daily basis and dispose of same at any (private or public) DEP approved dump that the General Contractor may choose providing that the General Contractor shall make all arrangements and obtain all approvals and permits necessary from the owner or officials in charge of such dumps. During disposal process, copies of daily receipts from dumpsite shall be submitted on a regular basis.

1.21 SAFETY PROTECTION

- A. At no time shall the work be left unattended without proper safety protection and shall not be left unprotected to the weather and accessible to the public. It is the responsibility of the General Contractor to maintain proper safety protection for the public while work is in progress or unattended.

1.22 VEHICLE AND EQUIPMENT PROTECTION

- A. All construction activities shall be performed in such a manner so as not to dust, stain or damage any building elements, equipment, vehicles, etc. within general vicinity of the construction work area. Any damage to these items shall be cleaned and repaired at the expense of the General Contractor.
 - 1. All construction vehicles and equipment on site shall be effectively disabled and secured when not in use.

1.23 SHORING

- A. The Subcontractors shall provide all temporary shoring and bracing as required for the proposed work. Comply with all applicable codes and standards.

1.24 CONSTRUCTION FENCE

- A. A construction fence is not required on this project, however, overhead protection shall be provided at every exit from the building whenever overhead work is performed in the vicinity.

1.25 PROJECT IDENTIFICATION

- A. No project sign is required by the Owner.
- B. If the Contractor wishes to provide a project sign, at his own expense, the Owner reserves the right to approve the content and appearance of the sign.
- C. Any signs will be located on site where directed by the Owner, and shall be relocated or removed if the Owner so directs.

1.26 DELIVERY OF MATERIALS

- A. All Materials shall be delivered to the Contractor's or Sub-Contractor's warehouse or may be delivered to the site if the Contractor's representative is present to receive them.
- B. No materials will be received by the Owner's personnel.

1.27 SHUT DOWN NOTICE

- A. The Contractor shall notify the Owner, at least fourteen (14) calendar days in advance, of the need for any utility shut down to install or modify any utilities or building systems. The shutdown request shall indicate:
 - 1. The utility to be shutdown.
 - 2. The duration of the shutdown.
 - 3. The spaces anticipated to be affected by the shutdown.
- B. Investigation of the existing systems to determine the areas served, the location of isolation valves or sub-panels, etc., is to be anticipated and included in the bid scope.
- C. Shutdowns involving sprinkler systems or fire alarm systems, for which the Authority Having Jurisdiction (AHJ) requires a fire watch, the contractor performing the shutdown shall provide and pay for the fire watch at no additional cost to the Owner.
- D. Utility shutdowns affecting other buildings will be limited to occur after normal working hours. No additional compensation will be paid for overtime.

1.28 EXCAVATIONS AND FIELD SURVEY REQUIREMENTS

- A. The only site work include din the project is related to the new entry stoop.

II. PART II - PRODUCTS (Not Used)

III. PART III - EXECUTION (Not Used)

END OF SECTION
01.50.00

SECTION 01.73.29

CUTTING AND PATCHING

I. PART-1 GENERAL

1.01 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 - GENERAL REQUIREMENTS, which are hereby made a part of this section of the specifications.

1.02 SCOPE OF WORK

- A. The General Contractor shall coordinate the work to ensure that all embedded or concealed items are placed prior to the closing of construction. Where opening up construction is required to install any aspect of the work, the General Contractor shall be solely responsible for the cutting and patching of such materials.

1.03 SUMMARY

- A. This Section specifies administrative and procedural requirements for cutting and patching.
- B. Refer to other Sections for specific requirements and limitations applicable to cutting and patching.

1.04 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.
- B. Obtain approval of the cutting and patching proposal from the Designer before cutting and patching structural elements.
- C. 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.
- D. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Designer's opinion, reduce the building's esthetic qualities, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

1.05 RELATED SECTIONS

- A. Section 4.13 - General Conditions of the Contract, Article 3.

II. 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 match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.
- B. Concrete, where used to patch abandoned penetrations in floors or roofs, shall be:

1. Normal weight concrete proportioned in accordance with ACI 211.1 and ACI 30 for 4,000 psi compressive strength @ 28 days.
 2. At openings over 6" wide, provide ASTM A 615/A 615M, Grade 60, deformed reinforcing bars doweled into to the existing slab 48" on center, both sides, staggered.
 3. At horizontal openings less than 6" wide, chip out the top of the opening to enlarge it, creating a tapered or conical hole to patch, such that the patch material cannot drop through the hole.
- C. Grout, where used to close annular space around floor or wall penetrations, shall be:
1. non-shrink type, prepackage and preproportioned, requiring only the addition of potable water before use, meeting or exceeding the following standards:
 - (a) General Properties: ASTM C 1107-02
 - (b) Compressive strength: ASTM C 109
 - (c) Bond Strength: ASTM C 882
- D. Mortar, where used for repointing existing masonry units, shall be a pre-blended bag mix mortar, Type N or strength to match existing construction. Where partial repointing is required, color shall match the existing to remain.

III. PART 3 - EXECUTION

3.01 PROTECTION

- A. Protect existing trees, plants, roads, walls etc. to remain. Special protection of any lawns and planting around buildings is the responsibility of the Contractor. Contractor will replace any planting killed or damaged by construction operations.

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.
1. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
 2. Take all precautions necessary to avoid cutting existing pipe, conduit or duct work serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.
- C. Furnish dropcloths, erect dust partitions and take other measures as required to control dust generated by cutting activities and prevent its spread to adjacent areas

3.03 PERFORMANCE

- A. The General Contractor shall be responsible for all cutting and patching, including all cutting and patching required by sub contractors.
1. 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.
 2. Before proceeding, meet at the site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and

resolve potential conflicts before proceeding.

- B. Firestopping, where required, shall be performed by the trade penetrating the wall, floor or ceiling. At all other areas requiring firestopping, work shall be performed by the General Contractor.
- C. General: Employ skilled workmen to perform cutting and patching. Where required to maintain an existing product or system warranty, such as a roof warranty, employ a manufacturer's approved and warranted Contractor to perform the 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.
- D. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review proposed procedures with the original installer; comply with the original installer's recommendations.
 - 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 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.
- E. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
 - 1. 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.
- F. Site Repair:
 - 1. Restore all lawns, plantings, trees to their original condition.
 - 2. Repair all walkways and driveways that were damaged due to construction.

3.04 CLEANING

- A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely paint, mortar, oils, putty and items of similar nature.
- B. Clean any portions of the building which were affected by dirt or dust generated by cutting, sanding or other construction activities.

END OF SECTION
01.73.29

SECTION 01.77.00

CLOSEOUT PROCEDURES

I. PART 1 - GENERAL

1.01 SCOPE

- A. This section lists the procedures required for the proper completion of this project including processing the Release of Retainage and making the Final Payment to the Contractor.
- B. Consult the Individual sections of the specifications for requirements affecting Project Close Out.

1.02 RELATED DOCUMENTS

- A. This section supplements the General Conditions.
- B. Consult the individual sections of the specifications for specific items required under those sections.

1.03 SUBSTANTIAL COMPLETION

- A. Prior to requesting Substantial Completion the Contractor shall make a thorough inspection of the Work. During this inspection the Contractor shall prepare a comprehensive list of all items remaining to be completed or corrected. This list shall include all remaining Contractor and Subcontractor items to be provided under the Contract Documents.
- B. Upon completion of the items noted on the Contractor's list the Contractor shall notify the Architect that the Work is Substantially Complete. The Architect shall then conduct a similar thorough inspection. If the Architect agrees that the Work is Substantially Complete, the Architect will promptly make a thorough inspection and prepare a punch list, setting forth in accurate detail any items on the Contractor's list and additional items that are not acceptable or incomplete. The Contractor shall coordinate all Subcontractors to achieve prompt completion of the punch list.
- C. The Contractor shall not be relieved of the responsibility to provide Contract items left off of the Architect's punch list.
- D. If the Architect determines that the Work is not Substantially Complete, the Architect shall inform the Contractor of those items that must be completed before the Architect will prepare a punch list. Upon completion of those items, the Contractor shall again request the Architect to prepare a punch list.
- E. When the punch list has been prepared, the Architect will arrange a meeting with the Contractor and Subcontractors to identify and explain all punch list items and answer questions on work which must be done before final acceptance.
- F. The Architect may revise the punch list, from time to time, to ensure that all items of Work are properly completed.
- G. The Architect shall prepare the Certificate of Substantial Completion in accordance with the General Conditions.
- H. The Contractors shall correct the items noted on the punchlist(s). The General Contractor shall check the work of his forces, and of all sub-contractors to verify that the work has been corrected, and notify the architect that the project is ready for reinspection. The Architect and Engineers may, at their discretion, check the work to confirm the punchlist has been completed, and advise the Owner.
 - 1. If the Contractor calls for reinspection, and the Project is not actually ready or punchlist items have not been corrected and subsequent reinspections are required, the Architect reserves the right to bill the Owner for the reinspections, and such monies will be deducted from the balance due to the

Contractor.

1.04 RECORD DRAWINGS

- A. As-built Drawings shall consist of all the Contract Drawings. As-built Drawings shall be kept up-to-date. Information from on-going Work shall be recorded on As-built Drawings within 48 hours of Work being performed.
- B. The General Contractor and each Subcontractor shall be required to maintain one set of As-built Drawings, as the work relates to their Sections of the Specifications, at the site.
- C. The As-built Drawings shall be stored and maintained in the General Contractor's field office or a secure location apart from other documents used for construction. The As-built Drawings shall be maintained in a clean, dry, and legible condition and shall not be used for construction purposes.
- D. As-built Drawings, as submitted by the General Contractor shall be verified in the field by the Designer or his Consultants. Verification by the Designer shall occur during the construction process and prior to the related work being completed and covered up.
- E. The As-built Drawings shall be available at all time for inspection by the Project Manager or Designer. All deficiencies noted shall be promptly corrected.
- F. The following information shall be indicated on the As-Built Drawings:
 - 1. Record all changes, including change orders, in the location, size, number and type both horizontally and vertically of all elements of the project which deviate from those indicated on all the Contract Drawings.
 - 2. The tolerance for the actual location of utilities and appurtenances within the building to be marked on the As-built Drawings shall be plus or minus two (2) inches.
 - 3. Each of the utilities and appurtenances shall be referenced by showing a tag number, area served and function on the As-built Drawings.
- G. At the end of each month and before payment for materials installed, the General Contractor, each Subcontractor, the Architect and Project Manager shall review the As-built Drawings for purpose of payment.
 - 1. If the changes in location of all installed elements are not shown on the As-Built Drawings and verified in the field, then the material shall not be considered as installed and payment will be withheld.
- H. Prior to the installation of all finish materials, a review of the As-built Drawings shall be made to confirm that all changes have been recorded. All costs to investigate such conditions shall be borne by the applicable party as determined by the Designer.
- I. At the completion of the contract, each Subcontractor shall submit to the General Contractor a complete set of his respective As-built Drawings indicating all changes. After checking the above drawings, the General Contractor shall certify in writing on the title sheet of the drawings that they are complete and correct and shall submit the As-built Drawings to the Designer.
- J. The original hand-noted as-Built Drawings shall be scanned in color to Adobe Acrobat (*.pdf) format and submitted on CD or DVD to the Designer, to be added to the complete plans as constructed.

1.05 RECORD SURVEYS

- A. Not applicable.

1.06 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. Consult the individual sections of the specifications for the specific requirements for those sections and for further details and descriptions of the requirements.
- B. Prior to final payment and completion the Contractor shall provide all Operating Manuals and Maintenance Instructions as required by the Contract Documents.
- C. Operating Instructions and Manuals:
 - 1. Subcontractors, installers, and suppliers shall furnish to the Contractor **three sets** of operating and maintenance instructions of all mechanical, electrical, and manually operated equipment furnished and installed by them. Mechanical and electrical subcontractors shall furnish instructions as specified in their respective sections.
 - 2. The Contractor shall collect all of the above instructions, bind them into **three complete sets**, and submit them to the Architect who will deliver them to the Owner.
 - 3. The Contractor shall prepare a USB thumb drive with PDFs of all O&M items and deliver to the Owner.
 - 4. Submission of operating and maintenance instructions shall be a condition precedent to final payment
- D. Instruction of Owner's Personnel
 - 1. Where specified in the individual sections of the specifications, the Contractor and Subcontractor shall instruct the Owner's personnel at the site, in the use and maintenance of equipment installed under the Contract.
 - 2. Submission to the Architect of a certificate of compliance to this requirement, signed by the Contractor and the Owner's Representative, shall be a condition precedent to final payment.

1.07 PARTIAL RELEASE OF RETAINAGE

- A. If within 65 days after Substantial Completion, any of the items on the Architect's punch list are not complete or if the Contractor has not provided the appropriate marked up As Built Drawings, Operating Manuals, Warranties, Guarantees, or Spare Parts the Architect shall assign a monetary value for each incomplete item as well as any other items as provided by M.G.L. c.30 §39K, and the Architect shall prepare a Certificate for Partial Release of Retainage
- B. If the Architect is required to prepare a Certificate for Partial Release of Retainage the Contractor shall complete all remaining Work in accordance with the provisions of the General Conditions.
- C. The Contractor's signature on this Certificate shall be notarized.
- D. The Contractor may make a request for additional releases of retainage when portions of the Work listed on the Architect's punch list have been satisfactorily completed. Each request shall be accompanied by a new application for payment and a new signed and notarized Certificate for Partial Release of Retainage.
- E. The Architect's inspections, required to complete the additional payment applications described above, are subject to provisions of the General Conditions.
- F. If the Owner has required Performance and Payment Bonds, then prior to the partial release of retainage, the General Contractor shall submit to the Owner Consent of Surety to Partial Release of Retainage using AIA Document G707A or an equivalent document.

1.08 FINAL RELEASE OF RETAINAGE

- A. Prior to the final release of retainage, the General Contractor shall submit to the Owner:
1. Consent of Surety, using AIA Document G707 or similar document, if performance and payment bonds were required for the project.
 2. Contractor's Affidavit of Release of Liens, using AIA Document G706A or equivalent. This document shall be accompanied by certified statements from all sub-contractors working on the project, that they have received all monies due, and have paid all suppliers and sub-sub contractors accordingly.
 - (a) Should any payments be outstanding and contingent upon receipt of the retainage in order to be paid, the General Contractor shall submit AIA Document 706, itemizing those items which have not been paid.

END OF SECTION
01.77.00

SECTION 02.08.00

ASBESTOS ABATEMENT

PART I - GENERAL

1.01 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 – GENERAL REQUIREMENTS, which are hereby made a part of this section of the specifications.
- B. The Contractor must be familiar with all other Divisions and Sections of the Specification which affect the work of this Section.

1.02 DEFINITIONS

- A. The following definitions shall be applicable to this Section:

“Site”: Refers to the Maintenance Building located at Greenhill Park in Worcester, Massachusetts as described by the Contract Documents and Drawings.

“Owner”: Refers to the City of Worcester and their designated, authorized personnel.

“Architect”: Refers to Nault Architects Inc., 71 Hope Avenue, Worcester, Massachusetts and their designated, authorized personnel.

“Consultant”: Refers to ATC Group Services LLC (ATC), 73 William Franks Drive, West Springfield, Massachusetts and their designated, authorized personnel.

“General Contractor”: Refers to the Contractor who has been awarded the overall contract for renovation work outlined by the Contract Documents.

“Asbestos Abatement Contractor”: Refers to the Contractor who is performing asbestos abatement work as outlined by this Section.

1.03 GENERAL REQUIREMENTS/QUALIFICATIONS

- A. All Asbestos Abatement work referenced herein shall be performed by a Massachusetts licensed Asbestos Abatement Contractor in accordance with Massachusetts Department of Labor Standards (DLS) 453 CMR 6.0 Regulations.
- B. Qualifications of Asbestos Abatement Contractor
 - 1. Asbestos Abatement Contractor performing the abatement work of this section (“Asbestos Abatement Contractor”) shall be an Asbestos Abatement Contractor licensed to perform asbestos operations in the State of Massachusetts. Asbestos Abatement Contractor shall submit license number and proof of licensure.

2. The Asbestos Abatement Contractor shall also provide the project name, contact person and phone number of three (3) projects which were successfully completed of similar size and scope within the last two (2) years. Each project shall have been completed in good standing and the work performed by the Asbestos Abatement Contractor for each project resulted in no work violations/citations, contract delays, contract extensions/disputes or litigation. Failure to provide this information and/or meet the approval of these qualifications by the Owner may result in rejection of the Asbestos Abatement Contractor.
3. The Owner, Architect or Consultant shall also reserve the right to research and utilize other information received from any other projects completed by the Asbestos Abatement Contractor not provided under 1.03 B (2) above, regardless of the date completed, location or circumstances resulting from the outcome of their work. The Owner shall reserve their right to reject the Asbestos Abatement Contractor based upon this review, for any reason, if found to be in the best interest of the Owner.

NOTE: The Asbestos Abatement Contractor shall not be authorized to begin work until all credentials outlined above are reviewed and approved by the Architect.

1.04 DESCRIPTION OF WORK

- A. Work: This section details all areas where asbestos abatement work is to be performed and lists areas requiring special protection during the abatement work. The Asbestos Abatement Contractor shall furnish all labor, materials, services, training, insurance, and equipment as needed to complete removal of asbestos-containing and asbestos-contaminated materials located as indicated below. The Asbestos Abatement Contractor shall follow all Federal, State and local ordinances, regulations and rules pertaining to asbestos, including its abatement, storage, transportation and disposal.
- B. The Asbestos Abatement Contractor shall be responsible for verifying all quantity estimates in preparation of their bids, including the location and conditions of all asbestos-containing materials to be abated under this contract. No additional compensation and/or contract time shall be granted to the Asbestos Abatement Contractor for failure to perform this requirement and no compensation shall be granted for variations in the quantities presented herein.
- C. The following Scope of Work and Requirements shall be applicable for asbestos abatement work at the site. If a specific note for an abatement procedure or requirement is not mentioned herein, the Asbestos Abatement Contractor shall perform the removal of such material in accordance with local, state and federal regulations. The Asbestos Abatement Contractor shall also coordinate all work with the General Contractor.
 1. All Asbestos Abatement work shall take place in accordance with the provisions outlined herein as well as current local, state and federal regulations. No additional compensation shall be granted to the Asbestos Abatement Contractor for compliance with applicable laws when performing the abatement work at the site. This shall include any regulatory requirements that mandate additional or more restrictive containment and abatement procedures than what has been presented herein. It shall be the Asbestos Abatement Contractor's responsibility to comply with such regulations as well as any other additional requirements outlined by this Section.

2. The Asbestos Abatement Contractor shall coordinate with the General Contractor as to the locations of areas to be abated in accordance with the Scope of Work outlined herein and the Drawings.
3. The Asbestos Abatement Contractor shall be responsible for all demolition work required in order to access all asbestos materials for abatement. All demolition debris shall be disposed of as asbestos waste, unless otherwise determined by the Consultant.
4. The following requirements shall be adhered to for removal of asbestos-containing glazing compound located on the window panes at the site:
 - a. All workers shall don appropriate personal protective equipment (PPE) including tyvec suits, respirators equipped with HEPA filters, gloves, safety glasses, etc.
 - b. The Asbestos Abatement Contractor shall establish a "Regulated Area" at the exterior portion of the building utilizing caution tape and asbestos signs at a sufficient distance to keep non-authorized personnel out of the work area.
 - c. If lifts are to be used for the work, the basket area and/or platform on the lift shall also be demarcated with asbestos signs.
 - d. A remote three (3) stage decontamination unit shall be established directly adjacent to the Regulated Area.
 - e. All windows, doors or vents on the same side of the building where active work is taking place shall be closed.
 - f. All windows within the Regulated Area shall be sealed at the interior side with 6-mil polyethylene sheeting (2 layers) and duct tape.
 - g. A drop-cloth of polyethylene sheeting (or cloth tarp) shall be placed on the ground and secured properly to the foundation within the Regulated Area. The sheeting shall extend a sufficient distance out from the foundation to encompass all areas where dust, debris or other waste being generated may fall to.
 - h. All drop-cloths or tarps shall be cleaned of accumulated debris no later than the end of the each work shift.
 - i. The existing window wells at each opening shall be pre-cleaned of all debris utilizing a HEPA vacuum and wet methods. This shall also include pre-cleaning all visible debris from the existing ground surfaces (i.e. grass, soil, tar, concrete, etc.) directly adjacent to the building.
 - j. Debris located on horizontal surfaces of the building (i.e. window ledges, overhangs, etc.) shall also be pre-cleaned of all visible debris.
 - k. All glazing compound shall be removed utilizing wet methods, manual scraping and HEPA Vacuums.
 - l. Mechanical means to remove the glazing compound shall not be permitted unless full containment under negative pressure is established around each window opening.
 - m. For window panes to be replaced, the scope shall include removal of all visible glazing compound and glass as ACM waste.
 - n. For all other window panes to remain, the scope shall only include removal of any loose and non-adhered glazing compound.
 - o. Upon completion of removal, the window units shall be cleaned by HEPA-vacuuming and/or wet wiped with a sponge or cloth. The interior poly barrier shall then be removed and disposed of as ACM and the window well areas shall be re-cleaned by HEPA vacuuming and/or wet wiping.
 - p. All equipment utilized in the work operation shall be cleaned of visible dust and debris by HEPA vacuuming and/or wet wiping prior to removal from the work area.

- q. All drop-cloths, tarps or polyethylene sheeting shall be cleaned of visible dust and debris by HEPA vacuuming and/or wet wiping. Dry sweeping will NOT be allowed.
 - r. All glazing compound, glass panes and associated debris shall be properly sealed in double six-mil bags and placed in fiberboard drums or other appropriate container for disposal as ACM.
5. Refer to Attachment A (Table 1.0) for a summary of materials that require abatement at the site. Refer to the Drawings and coordinate all work with the General Contractor.

1.05 SUBMITTALS

- A. In addition to items required by other sections of the Project Manual, the following submittals are required for review and approval by the Architect on/or before the Pre-Construction Meeting:
- 1. Copy of Massachusetts DLS Asbestos Abatement Contractor's License
 - 2. Copy of the asbestos Notification (ANF01)
 - 3. Chain-Of-Command list of all personnel on-site and emergency contact person(s)
 - 4. Work plan which dictates all removal procedures to be implemented
 - 5. Proposed waste hauler and disposal site for asbestos
 - 6. Copy of proposed Waste Shipment Record to be used for disposal of asbestos.
- B. In addition to the items required by other sections of the Project Manual, the following submittals are required for final payment
- 1. Copy of Waste Shipment Records

1.06 CODES AND STANDARDS

- A. All work shall conform to the standards set by applicable Federal, State and local laws, regulations, ordinances, and guidelines in such form in which they exist at the time of the work on the contract, and as may be required by subsequent regulations. In addition to any detailed requirements of the Specification, the Asbestos Abatement Contractor shall at his own cost and expense comply with all laws, ordinances, rules and regulations of Federal, State, Regional and Local Authorities regarding handling and storing of asbestos waste material. This includes all applicable OSHA regulations.
- B. All regulations and other governing agencies in their most current version are applicable throughout this project. Where there is a conflict between this Specification and the cited State, Federal, or local regulations, the more restrictive or stringent requirements shall prevail. This Section refers to many requirements found in these references, but in no way is it intended to cite or reiterate all provisions therein or elsewhere. It is the Asbestos Abatement Contractor's responsibility to know, understand, and abide by all such regulations and common practices.

1.07 FEES, PERMITS & LICENSES

- A. The Asbestos Abatement Contractor shall pay all licensing fees, royalties, and other costs necessary for the use of any copyrighted or patented product, design, invention, or process in the performance of the work specified in this section. The Asbestos Abatement Contractor shall be solely responsible for costs, damages, or losses resulting from any infringement of these patent rights or copyrights. The Asbestos Abatement Contractor shall hold the Owner, Consultant and

Architect harmless from any costs, damages, and losses resulting from any infringement of these patent rights or copyrights. If the Contract Specification requests the use of any product, design, invention, or process that requires a licensing, patent or royalty fee for use in the performance of the job, the Asbestos Abatement Contractor shall be responsible for the fee or royalty fee and shall disclose the existence of such rights.

- B. Asbestos Abatement Contractor shall be responsible for costs for all licensing requirements, where applicable and notification requirements and all other fees related to the Asbestos Abatement Contractors ability to perform the work in this Section.
- C. Secure all necessary permits for work under this Section, including hauling, removal, and disposal, fire, and materials usage, or any other permits required to perform the specified work.

1.08 CLEANING

- A. Maintain the work site in a neat and orderly manner at all times, so as not to interrupt or infringe upon the work of other trades. Perform all final cleaning of abatement work areas as required by this Section and Massachusetts Regulations to the approval of the Owner's Consultant. Upon completion of work in any given area, Asbestos Abatement Contractor shall remove all material and equipment associated with the work, not necessary to complete other phases of the work in that area.
- B. Comply with all requirements for final clearance and release of a work area as described in this Section and required by the Massachusetts Regulations prior to take down of polyethylene and area clean-up.

1.09 COORDINATION

- A. Extend full cooperation to Owner in all matters involving the use of Owner's facilities. At no time shall the Asbestos Abatement Contractor cause or allow to be caused conditions, which may cause risk or hazard to the general public, or conditions that might impair safe use of the facility.
- B. Coordinate the work of this section with that of all other trades as directed by the General Contractor and at the express consent of the Owner and Architect. Phasing and scheduling of this project will be subject to the approval of the Owner and Architect. The work of this Section shall be scheduled and performed so as not to impede the progress of the project as a whole. Work shall not proceed in any area without the express consent of the Owner and Architect. The Asbestos Abatement Contractor shall be available within 24 hours notice for additional work if after acceptance of the work it is found that full abatement was not achieved from the initial work effort as determined by the Owner, Architect or Consultant.
- C. Complete Asbestos activities in the phases of the final schedule agreed upon by Owner and General Contractor.

1.10 SUBSTITUTION OF MATERIALS OR METHODS

- A. Owner and Architect approval is required for all modifications to methods, procedures, and design, which may be proposed by the Asbestos Abatement Contractor. It is the intent of these documents to allow the Asbestos Abatement Contractor to present alternative methods to the abatement processes herein, for review by Owner and Architect. Any such modifications or

substitutions to methods, procedures, or design shall comply with applicable regulations. Asbestos Abatement Contractor shall submit the proposed modification or substitution in accordance with the requirements of the General Conditions, and no later than fifteen (15) working days prior to planned commencement of proposed modification, for review and approval.

- B. Unless requests for modification or substitution are made in accordance with the above instructions and the instruction of the General Conditions, supported by sufficient proof of equality, Asbestos Abatement Contractor shall be required to furnish the specifically named or designed items, methods or procedures designated in this Section.
- C. If the modification or substitution necessitates changes or additional work, same shall be provided and the Asbestos Abatement Contractor shall assume the cost and the entire responsibility thereto unless performed under the approved Change Order Process.
- D. The Owner and Architect's permission to make such substitution shall not relieve the Asbestos Abatement Contractor from full responsibility for the work.

1.11 SITE SECURITY

- A. The Asbestos Abatement Contractor is responsible for performing all work under this contract without contaminating the building environment with asbestos fibers. This includes interiors of duct work, outside containment locations, machinery and equipment and any other release into unregulated spaces. The Asbestos Abatement Contractor is responsible for making right and clean-up of any such contamination if found to be present.
- B. The Asbestos Abatement Contractor will be responsible for the security of the abatement area, allowing only authorized personnel into the area, and securing assigned entrances and exits with locked doorway's at the end of the work day. Signs will be posted prior to asbestos removal as required in 29 CFR 1926.1101.

1.12 PROJECT MONITOR

- A. The Owner has retained ATC as their Consultant for the technical advisement and project management during the Project. In addition, ATC will perform project monitoring services during abatement activities. The Contractor shall regard ATC's direction, as authoritative and binding as provided herein, in matters outlined by this Section.
- B. ATC's licensed Project Monitor, acting as the Owner's Representative, will perform monitoring of Contractor work practices and performance, inspection of the worksites, and air sampling and analysis for each phase of the asbestos removal project. Quality control and testing criteria has been established in these specifications, and will be strictly enforced. ATC's Project Monitor will review matters relating to safety, interpretation of the specifications, and scheduling of work, and will make decisions upon consultation with the Architect and Owner.

1.13 TEMPORARY FACILITIES

- A. Use of Owner provided facilities is specified in Division 1 and shall be coordinated through the Owner and General Contractor.

PART II - PRODUCTS

2.01 MATERIALS

- A. All materials and equipment proposed to be used on this project shall be subject to the acceptance of the Owner, Architect and Consultant. The Asbestos Abatement Contractor shall comply with local, state and federal regulations pertaining to the selection and use of materials and equipment on this project. The Asbestos Abatement Contractor shall provide a submittal on all materials and equipment to be used for review and approval by the Architect and Consultant prior to commencement of the work.

PART III - EXECUTION

3.01 WORK AREA PREPARATION/ABATEMENT

- A. Refer to Part 1.04 C, 4 for specific requirements associated with work area set up, pre-cleaning, abatement, final cleaning and disposal.
- B. Visual Inspections: Work areas shall pass a visual inspection conducted by the Site Supervisor responsible for the project and the Owner's Project Monitor (i.e. Consultant). The criterion for this inspection will be the absence of visible debris in accordance with ASTM standard E1368-90. A certificate of visual inspection will be signed by the Project Monitor and the Site Supervisor after final inspection clearance.

3.02 DISPOSAL

- A. Packaging: Prior to post-abatement inspection, asbestos- containing waste material (ACWM) shall be packaged in sealed double containers and removed from the work area to a specified transportation vehicle or a designated holding area approved by the Owner. At the end of each work day the Asbestos Abatement Contractor shall remove the debris accumulated during that day's work activities using procedures outlined in the Specifications. The Asbestos Abatement Contractor shall provide a daily tally of all bags removed.
- B. Temporary Storage of Waste: An area for temporary storage of ACWM must be approved by the Owner. ACWM must be stored in a restricted area and must be in an **enclosed container** which is posted and secured whenever not in use. ACWM shall NOT be store outside the building on the ground, pavement areas or other non-enclosed area. ACWM waste material shall be loaded into a waste transportation vehicle/dumpster and hauled away as soon as there is a sufficient quantity available for direct transportation to the approved disposal site. ACWM waste shall **NOT** be transferred back to the Asbestos Abatement Contractor's yard/facility unless approved by the Owner. ACWM shall only be stored at:
 1. An approved refuse transfer station facility permitted or that is managing such wastes in accordance with 310 CMR 19.061 and/or;
 2. The site of generation of the asbestos abatement activity.

Note: All ACWM shall be shipped from the site for disposal within 30 days after completion of the work and acceptance of a final visual inspection by the Consultant.

- C. OSHA/EPA labeling: Asbestos warning labels having permanent adhesive and waterproof print, or being permanently printed on the container, shall be affixed to the outside of all asbestos containers, and each inside bag. Labels will be conspicuous and legible and shall contain the following warning:

DANGER
CONTAINS ASBESTOS FIBERS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
DO NOT BREATHE DUST
AVOID CREATING DUST

The Asbestos Abatement Contractor is directed to properly label each waste bag in accordance with the latest NESHAP standard, Section 61.150, with the following information:

SITE OWNER'S NAME
SITE NAME

- D. DOT labeling and marking: A DOT "class 9" shipping label and DOT mark shall be applied to or be printed on each packaging of ACWM.
- E. Waste Transportation: All ACWM waste shall be containerized pursuant to 310 CMR 7.15 prior to being transported. All ACWM waste shall be transported in totally enclosed vehicles or containers that are designed, constructed, and operated to prevent spills, leaks or emissions. All ACWM waste shall be transported in compliance with 40 CFR Part 61 and applicable Department of Transportation (DOT), OSHA and local regulations. Each vehicle transporting asbestos-containing waste shall be marked with asbestos danger signs during loading and unloading of the waste, in accordance with the NESHAP, 40 CFR 61.150.
- F. Asbestos waste shipment records: The Asbestos Abatement Contractor shall prepare the waste shipment records for disposal of the ACWM. **All ACWM waste to be disposed of from the site shall be shipped on UMASS's approved "Asbestos Waste Shipment Record". A copy of the UMASS Asbestos Waste Shipment Record shall be provided to the Asbestos Abatement Contractor during the pre-construction meeting for the project. A representative from UMASS EH&S shall sign-off as "Generator" on the Asbestos Waste Shipment Record for each shipment leaving the site.**
- G. The following information shall be included on the waste shipment record for each and every load of ACM transported off-site:
1. The name, address and telephone number of the owner/operator of the facility or dumping ground where asbestos abatement activities have occurred;
 2. The quantity and type (friable or non-friable) of the ACWM in cubic meters (cubic yards) and a description of the container used for shipment;
 3. The name, address and telephone number of the person who conducted any asbestos abatement activity;
 4. The name and telephone number of the disposal site operator;
 5. The name and physical location of the disposal site;
 6. The date transported;
 7. The name, address, and telephone number of the transporter(s);

8. Certification by the owner/operator of the facility or dumping ground where asbestos abatement activities have occurred/where asbestos waste was generated that the contents of each shipment have been characterized, packaged, marked and labeled in accordance with 310 CMR 7.15;
9. Signature of each transporter confirming the contents of each shipment are in all respects in the proper condition for transport according to applicable international, federal, state and local regulations;
10. Signature by the receiving disposal facility confirming that: i) the quantity of ACWM listed on the waste shipment record is the same as the quantity accepted for disposal; and ii) it holds appropriate permits and/or authorizations to accept for disposal ACWM described on waste shipment records.

Note: The final waste shipment records (with signature of acceptance at the landfill) for disposal of ACM from the project site shall be received by the Owner within 35 days of shipment from the site.

3.04 QUALITY CONTROL AND TESTING

- A. The Asbestos Abatement Contractor shall be responsible for achieving acceptable visual for ALL abatement areas as follows:
- Clearance inspection: ATC's Project Monitor shall inspect the work area and surrounding areas for clearance using visual and physical methods, prior to clearing the project for air monitoring clearance procedures.
 - Post-abatement Clearance Air Monitoring: Will **NOT** be required if the work is performed to the exterior of the building. However, if abatement is performed at the interior of the building and/or if mechanical means are used to remove the ACM, then post abatement clearance air samples will be taken when a visual inspection by ATC's Project Monitor detects no visible debris, and surfaces are encapsulated and dry. Phase Contrast Microscopy (PCM) clearance testing will be performed to confirm the completion of removal in accordance with state of Massachusetts Regulations. The work areas shall be considered complete if the following criteria is met:
 1. Containment's cleared and samples analyzed by Phase Contrast Microscopy (PCM): Maximum airborne fiber concentration of <0.01 fibers per cubic centimeter for each sample.

Note: Should results indicate a fiber concentration greater than the clearance criteria stated above or if the visual inspection fails, the Asbestos Abatement Contractor shall reclean the entire work at no additional cost to Owner, utilizing the methods specified in this section. The Asbestos Abatement Contractor shall pay for all additional testing and inspections until the clearance level is achieved as per this Section. The cost of additional testing and inspection shall be paid by the Asbestos Abatement Contractor by subtracting the cost for analysis and inspector's time from the Contract total. This shall also include resampling of any areas where air cassettes became overloaded due to construction activities.

ATTACHMENT A

**TABLE 1.0
SUMMARY OF ASBESTOS-CONTAINING MATERIALS TO BE ABATED**

**TABLE 1.0
SUMMARY OF ASBESTOS-CONTAINING MATERIALS TO BE ABATED**

LOCATION	MATERIAL	SCOPE/NOTES
Exterior Windows	Glazing Compound	<ul style="list-style-type: none"> ➤ Includes removal of all visible glazing compound from window panes to be replaced. ➤ Includes removal of any loose and non-adhered glazing compound of the remaining window units on the building. ➤ Refer to Drawings for locations of window panes to be replaced and coordinate all work with the General Contractor

SECTION 02.08.10

DISTURBANCE OF LEAD, CADMIUM & CHROMIUM MATERIALS

PART I - GENERAL

1.01 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 – GENERAL REQUIREMENTS, which are hereby made a part of this section of the specifications.
- B. Equality of material, article, assembly or system other than those named or described in this Section shall be determined in accordance with the provisions of Article IV of the CONTRACT AND GENERAL CONDITIONS.

1.02 DEFINITIONS

- A. The following definitions shall be applicable to this Section:

“Site”: Refers to the Maintenance Building located at Greenhill Park in Worcester, Massachusetts as described by the Contract Documents and Drawings.

“Owner”: Refers to the City of Worcester and their designated, authorized personnel.

“Architect”: Refers to Nault Architects Inc., 71 Hope Avenue, Worcester, Massachusetts and their designated, authorized personnel.

“Consultant”: Refers to ATC Group Services LLC (ATC), 73 William Franks Drive, West Springfield, Massachusetts and their designated, authorized personnel.

“Contractor”: Refers to the General Contractor and all Subcontractors who are performing construction work outlined by the Contract Documents. Contractor as referenced, applies to **ALL** trades (including Filed Subcontractors) working at the site.

1.03 DESCRIPTION OF WORK

- A. The Contractor shall be made aware that lead, cadmium and chromium is present within painted substrates or within building components throughout the site building which will be impacted by renovation activities on this project.
- B. The Contractor shall be required to comply with all aspects of the Occupational Safety and Health Administration (OSHA) Regulations pertaining to lead, cadmium and chromium with regards to disturbance of these materials when performing their work.
- C. It shall be the sole responsibility of the Contractor for compliance with this Section, including all costs associated with, but not limited to:
 - Compliance with OSHA 29 CFR 1926.62 Lead Regulations.
 - Compliance with OSHA 29 CFR 1926.1127 Cadmium Regulations.
 - Compliance with OSHA 29 CFR 1926.1126 Chromium Regulations.
 - Development and implementation of a Compliance Program.
 - Development and implementation of a Respiratory Program.
 - Development and implementation of a Medical Monitoring Program.

- Development and implementation of a Hazard Communication Program.
 - Performance of any lead, cadmium or chromium testing required on the project.
 - Performance of any Negative Exposure Assessments required.
 - Providing all medical examinations required.
 - Providing all equipment required (Including appropriate PPE)
 - Providing all engineering controls and associated work practices.
 - Disposing of all demolition material in accordance with local, state and federal regulations
- D. It should be noted that abatement of lead paint by a licensed Abatement Contractor shall not be required for performance of the renovation work outlined under this Contract. The building is not considered a residence where children under the age of six (6) reside, therefore, abatement of lead-containing components will not be required as per Massachusetts Department of Public Health (DPH) "Child Lead Poisoning and Prevention Regulations.
- E. However, if the Contractor deems that removal of the lead, cadmium or chromium paint will be an appropriate "engineering control" for compliance with their OSHA programs, then such removal shall be performed at the Contractor's own expense in accordance with applicable requirements. No additional compensation shall be granted for any engineering control methods employed by the Contractor for compliance with this Section, OSHA or other applicable requirements. In addition, all costs associated with removal of paint to meet compliance with applicable construction standards (i.e. welding, torch cutting, grinding, etc.) shall be the responsibility of the Contractor under the Base Bid.
- F. Due to the age of the building and previous painting history, the Contractor shall assume all painted surfaces to contain lead, cadmium and chromium and comply with this Section and OSHA Regulations accordingly. In addition, building components such as pipe sleeves, conduit, electrical equipment, etc. may also contain lead, cadmium or chromium that will require compliance accordingly. The Contractor, at their own discretion may elect to perform testing to confirm the presence of lead, cadmium and chromium in the building. However, all costs associated with additional testing and compliance with this Section shall be borne by the Contractor under the Base Bid.
- G. OSHA regulates activities that disturb the lead, cadmium and chromium by the use of manual techniques. Regulated activities include abrasive blasting, welding, and cutting, burning on structures, manual scraping or sanding, and manual demolition of structures or components. The work practices described in this Section are intended to adequately protect the workers from exposure to lead, cadmium and chromium, provide a safe workplace, and protect the environment. However, it shall be the Contractors responsibility to comply with this Section as well as any other provisions/requirements outlined by OSHA and other applicable regulations.
- H. Materials and Equipment: The work of this Section, without limiting the generality thereof, includes the furnishing of labor, materials, tools, equipment, services and incidentals necessary to safely accomplish tasks which will disturb lead, cadmium and chromium.
- I. Approvals and Inspections: Temporary facilities, work procedures, equipment, materials, services, and agreements must fully comply with EPA, OSHA, and NIOSH recommendations, standards and guidelines, as well as any other applicable federal, state, and local regulations. Where there exists an overlap of these regulations and guidelines, the most stringent shall apply.
- J. Disposal: The Contractor shall dispose of demolition debris and associated materials in accordance with Part 3.06 of this Section.

1.04 SITE WORK DEFINITIONS

- A. Action Level: Action Level as defined by OSHA shall refer to employee exposure, without regard to the use of respirators, to an airborne concentration of lead, cadmium or chromium calculated as an 8-hour time-weighted average (TWA).

- B. Competent Person: Competent Person shall refer to a person who is capable of identifying existing and predictable hazards in the surroundings or working conditions and who has authorization to take prompt corrective measures to eliminate them.
- C. HEPA Filter: HEPA Filter shall refer to a filter capable of filtering out monodispersive particles of 0.3 microns or greater diameter from a body of air at 99.97 percent efficiency or greater.
- D. Lead, Cadmium and Chromium Paint: Shall refer to paint found to contain lead, cadmium and chromium in any concentration or paint assumed to contain lead, cadmium and chromium as indicated in this Section.
- E. Permissible Exposure Limit (PEL): PEL shall refer to employee exposure, without regard to the use of respirators, to an airborne concentration of lead, cadmium or chromium calculated as an 8 hour time-weighted average.

1.05 PERMITS AND INSPECTIONS

- A. Notifications/Approvals: The Contractor shall make, in proper and timely fashion, any necessary notifications to relevant Federal, State, and local authorities and shall obtain and comply with the provisions of all permits or applications required by the work specified, as well as make all required submittals required under those auspices. The Contractor shall indemnify the Owner, their representatives and agents from, and pay for claims resulting from failure to adhere to these provisions. The costs for permits, applications, and the like, are to be assumed by the Contractor.
- B. Fees, Permits and Licenses: The Contractor shall pay licensing fees, royalties, and other costs necessary for the use of any copyrighted or patented product, design, invention, or processing the performance of the job specified in this Section. The Contractor shall be solely responsible for costs, damages or losses resulting from any infringement of these patent rights or copyrights. The Contractor shall hold the Owner and Consultant harmless from any costs, damages, and losses resulting from any infringement of these patent rights or copyrights. If the Specification requests the use of any product, design, invention, or process that requires a licensing fee or royalty fee for use in the performance of the job, the Contractor shall be responsible for the fee or royalty and shall disclose the existence of such rights.
- C. Contractor shall be responsible for costs for licensing requirements and notification requirements and other fees related to the ability to perform the work in this Section. The Contractor shall be responsible for securing necessary permits for work under this Section, including removal, materials usage, or any other permits required to perform the specified work.

1.06 SUBMITTALS

- A. Pre-Construction Submittals: Prior to the commencement of the required work, the Contractor shall provide the following to the Architect for approval:
 - A written description detailing the means and methods to achieve compliance with the OSHA standards as well as the provisions outlined herein.
 - A written description detailing the means and methods for properly disposing of all demolition debris in accordance with local, state and federal regulations.
- B. Post-Construction Submittals: Final payment to the Contractor shall not be made unless the following items are submitted to the Architect for approval:
 - Original Copy of Waste Disposal Manifests acknowledging disposal of any hazardous and non-hazardous waste material from the project showing delivery date, quantity, and appropriate signature of landfill's authorized representative.

1.07 QUALITY CONTROL/ASSURANCE

- A. Training Requirements: Workers who will have the potential of lead, cadmium and chromium exposure shall have proof of successfully completing a training course which covers the topics required by OSHA. Contractors are also advised that training in other areas may be required by OSHA and are responsible to ensure that all training requirements for appropriate trades and procedures are met.
- B. Specified Supervisor Qualifications: The Contractor shall specify an on-site Supervisor or Competent Person who is fully qualified in all aspects of safe work practices and procedures, and have (or will have) completed a training course within the previous year prior to the commencement of the work. The training course will cover all topics required by OSHA as well as training in relevant federal, state and local regulatory requirements, procedures and standards, supervisory techniques, and proper disposal procedures.
- C. Site Specific Written Compliance Program: The program will be evaluated to ensure the elements required by OSHA are specific to the conditions at the job site.
- D. Respiratory Protection Program: The Contractor must provide for review a written respiratory protection program in accordance with 29 CFR 1920.103 if respiratory protection is to be worn during this project.
- E. Fit Test Records: If respiratory protection is to be worn as part of this project, records of successful respirator fit testing performed by a qualified individual within the previous 12 months, for each employee to be used on this project with the employee's name and social security number with each record.
- F. Medical Surveillance: The Contractor shall provide biological monitoring to workers who have the potential of lead, cadmium and chromium exposure. This monitoring shall be performed in accordance with OSHA. If workers are expected to exceed the action level for more than 30 days in any consecutive 12 months the Contractor shall institute a medical surveillance program in accordance with OSHA. A laboratory approved by OSHA shall conduct Blood level sampling and analysis.

1.08 CODES AND STANDARDS

- A. Work shall conform to the standards set by applicable federal, state and local laws, regulations, ordinances, and guidelines in such form in which they exist at the time of the work on the contract and as may be required by subsequent regulations.
- B. In addition to any detailed requirements of the Specification, the Contractor shall at his own cost and expense comply with all laws, ordinances, rules and regulations of federal, state, regional and local authorities regarding handling and storing of waste material.

NOTE: Regulations by the above and other governing agencies in their most current version are applicable throughout this project. Where there is a conflict between this Specification and the cited federal, state or local regulations or guidelines, the more restrictive or stringent requirements shall prevail. This Section refers to many requirements found in these references, but in no way is it intended to cite or reiterate all provisions therein or elsewhere. It is the Contractor's responsibility to know, understand, and abide by all such regulations, guidelines and common practices.

PART 2.0 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. The Contractor shall be responsible for providing all material and protective equipment required for performance of the work. The Contractor shall comply with all local, state and federal regulations pertaining to the selection and use of materials and equipment on this project. The Contractor shall provide a submittal on all materials and equipment to be used for review and approval by the Architect.

PART 3.0 - EXECUTION

3.01 WORKER PROTECTION

- A. Initial Determination: The Contractor shall determine, through personal exposure monitoring on the job site or through relevant documentation from other similar jobs, whether workers will be exposed to airborne lead, cadmium or chromium at or above the OSHA Action Level and Permissible Exposure Limit. If exposures at or above the action level are documented, appropriate health and safety procedures identified herein shall be followed. If levels below the action level are documented, the Contractor shall exercise an appropriate level of care to ensure that exposures above the action level do not occur. Whenever there is a chance of equipment, process, control, personnel or a new task has been initiated that may result in additional employees being exposed to lead, cadmium or chromium at or at or above the action level or may result in employees already exposed at or above the action level being exposed above the PEL, the Contractor shall conduct additional monitoring.

Note: The Contractor shall be responsible for performing a negative exposure assessment on each trade subject to the OSHA Regulation. The assessment shall take place during routine work activities, which will simulate employees, actual exposure levels to lead, cadmium and chromium. All assessments shall take place over an 8-hour time period and shall include all appropriate PPE and biological monitoring required as stated herein.

- B. Personal Hygiene Practices: Where exposures to airborne lead, cadmium and chromium above the OSHA PEL occurs or may be expected to occur, the Contractor shall enforce and follow good personal hygiene practices. These practices shall be performed until personal exposure sampling indicates that exposures are below the PEL at which time the Contractor has the option to continue or discontinue the use of personal hygiene facilities. These practices shall include but not be limited to the following:
1. No eating, drinking, smoking, or applying of cosmetics in work area. The Contractor will provide a clean space, separated from the work area, for these activities.
 2. Workers must wash upon leaving the work area. The Contractor will provide wash facilities. This wash facility will consist of, at least, running potable water, towels, and a HEPA vacuum. Upon leaving the work area, each worker will remove and dispose of work suit, wash and dry face and hands, and vacuum clothes.
 3. Disposable clothing, such as TYVEK suits, and other personal protective equipment (PPE) must be donned prior to entering work area. A clean room will be provided for workers to put on suits and other personal protective equipment and to store their street clothes. Disposable suits shall be used once, then properly discarded.
 4. A lavatory facility must be provided and located adjacent to the work area. The eating and drinking area, clean room, and the lavatory facility must be maintained in a clean and orderly fashion at all times. The Contractor will provide portable lavatories when needed and disinfect them daily.
 5. If air-monitoring data gathered by the Contractor shows that employees' exposure to airborne lead, cadmium or chromium exceeds the PEL, the following conditions apply:
 - a. Showers must be provided. Shower water must pass through at least a 5.0 micron filter before returning to the public waste system.

- b. Workers must shower upon leaving work area.
- c. Three-stage decontamination unit must be established consisting of an Equipment Room, Shower, and Clean Room in series.

3.02 WORK AREA SET UP

- A. Site Safety: The Contractor is responsible for all safety at the work site. This includes, but is not limited to, electrical safety, mechanical (tool) safety, fire safety, and personnel protective safety. Safety requirements are, for the most part, common sense and sound business

practice; however, the Contractor is advised that federal, state, and local regulations exist which govern safety on the work site. Therefore, in addition to the following, the Contractor is responsible for adhering to the most stringent requirements in effect.

- B. Signage: Prior to the preparation for work which will disturb lead, cadmium or chromium, the Contractor shall place warning signs immediately outside all entrances and exits to the area, warning that lead, cadmium and chromium work is being conducted in the vicinity. The signs shall be at least 20" x 14" and read:

WARNING:
LEAD, CADMIUM, CHROMIUM WORK AREA
POISON
NO SMOKING, EATING OR DRINKING
ALLOWED IN THE WORK AREA

The signs shall be in bold lettering with lettering not smaller than two inches tall. Should personal exposure monitoring results indicate that exposures are below the Action Level, then the signs will not be required.

- C. Access to Work Areas: It will be the Contractor's responsibility to allow only authorized personnel into the work area. Barrier tape shall be used to limit access to the exterior work area. Contractor shall maintain a bound logbook, in which any person entering or leaving the work area must sign and enter the dates and times of entry and departure. Should personal exposure results indicate the exposures are below the Action Level, then a logbook will not be required. The Contractor or competent person will not allow anyone access to the work area unless they have successfully passed an approved training program, and have been fitted and wearing a properly fitted respirator.
- D. Dumpsters used to store hazardous waste shall be DOT approved, solid enclosed containers and locked and secured at all times.
- E. Containment controls (including critical barriers, protective coverings, HEPA-filtered ventilation and decontamination facilities) may be required for renovation/demolition work. The degree of containment shall be appropriate for the anticipated levels of airborne dust. The lower the level of airborne dust, the lesser the requirements necessary to control lead, cadmium and chromium emissions at the job site.
- F. The Contractor shall isolate work areas for the duration of work by completely sealing off all openings in the work area. Isolation sealing shall be accomplished by constructing critical barriers where necessary around the work area perimeter. The work area shall be sealed airtight to the greatest extent possible.

- G. The Contractor shall erect one or more Decontamination Facilities (if applicable) to serve each work area. The facility will consist of series of two or more connected chambers including, at a minimum, a clean room and a shower/wash room, separated by an air lock. Unless otherwise specified, the shower/wash room shall be contiguous to the work area. Non-contiguous, remote, three-chamber decontamination facilities may be substituted with the Consultant's prior written approval. Three-chamber decontamination facilities shall include an equipment room to be used for removal and temporary storage of contaminated worker clothing, equipment, and other items leaving the work area, prior to decontamination in the shower/wash room of the decontamination facility. In all cases, non-emergency access between contaminated and uncontaminated rooms or areas shall only be through the Decontamination Facility/Wash Room.
- H. Ensure that barriers and linings are effectively sealed and taped at all times, and that the Shower/Wash Room floor is completely watertight. Repair damaged barriers, and remedy defects immediately upon discovery. Visually inspect enclosures at the beginning of each work period.
- I. All renovation/demolition work areas shall remain isolated from all other trades on the project and remain inaccessible to the public. Contractor shall monitor the access to the renovation/demolition work areas. The below listed items are required to control the generation of lead, cadmium and chromium containing dust during renovation/demolition activities if worker exposure is above the PEL. The Contractor is ultimately responsible for cleaning all generated dust and debris from renovation/demolition operations and must maintain work areas free from dust generated from renovation/demolition activities.
 - 1. Signs shall be posted at all approaches to the work area warning that work involving lead is being conducted in the vicinity. Signs shall be in bold lettering not smaller than two inches tall.
 - 2. Barriers shall not be removed until the work areas are thoroughly cleaned and approved by the Consultant.

3.03 WORK PROCEDURES

- A. The Contractor shall initiate, and continue, sufficient engineering and work practice controls, as described in the Contractor's Compliance Programs, to reduce and maintain worker exposures to lead, cadmium and chromium at or below the Action Level or Permissible Exposure Limit.
- B. The following work practices are specifically required by these specifications:
 - 1. All persons except those directly involved in the work shall be excluded from the work area. Physical barriers shall be used, where necessary, to limit access to the work area for the duration of the renovation activities. (Warning signs may need to be posted in accordance with applicable regulations.)
 - 2. Provide hand washing facilities and assure that all workers thoroughly wash their hands and face upon exiting the work area. Workers shall pay careful attention to cleanse the hands and face when decontaminating (Provide hygiene facilities, including shower, as required based on initial assessment and continued monitoring.)
 - 3. Thoroughly wet the areas to be demolished and mist the air to reduce the potential for creating airborne lead, cadmium and chromium dust.
 - 4. All equipment used by the workers inside the work area shall be either left in the work area or thoroughly decontaminated before being removed from the area. Extra work clothing (in addition to the disposable suits supplied by the Contractor) shall be left in the clean area until the completion of work in that area. The clean area shall be cleaned of all visible debris and disposable materials daily.
 - 5. Under no circumstances shall workers or supervisory personnel eat, drink, smoke, chew gum, or chew tobacco in the work area; to do so shall be grounds for the Engineer to stop all demolition operations. Only in the case of life threatening emergency shall workers or supervisory personnel be allowed to remove their protective respirators, if applicable, while in the work area. In this situation, respirators are to be removed for as short a duration as possible.

6. Feasible engineering controls shall be implemented by the Contractor to minimize the possibility of contamination of areas adjacent to the work area. The following activities are the minimum requirements of this section and affect the renovation/demolition performed on the project:
 - a. No torch cutting, mechanical sanding or stripping or abrasive methods of paint removal shall occur.
 - b. No renovation/demolition activities may occur which increase the workers exposure above the Action Level or Permissible Exposure Limit as described under OSHA.
7. Workers shall be informed of the components to be impacted during renovation/demolition that are identified as containing lead, cadmium and chromium.
8. Separation of Trades: Unprotected, untrained workers or trades shall not perform any related work within the same areas as demolition involving components identified as containing lead, cadmium and chromium. Other trades may not enter these areas until clean-up procedures are completed.

3.04 AIR SAMPLING – CONTRACTOR

- A. Personal Exposure Monitoring: The Contractor shall perform personal exposure sampling to monitor personal exposure levels to airborne lead, cadmium and chromium. Samples shall be taken for the duration of the work shift or for eight hours, whichever is greater. Personal samples need not be taken every day after the first day if working conditions remain unchanged, but must be taken every time there is a change in the removal operation, either in terms of the location or the type of work. Sampling will be used to determine eight-hour Time-Weighted-Averages (TWA). The Contractor is responsible for personal sampling as outlined in the OSHA Standards.
- B. Frequency: Air monitoring frequency will be established in accordance with the requirements set forth the OSHA Standards.

3.05 CLEAN-UP PROCEDURES

- A. When work is in progress, the work site shall be cleaned at end of each day's activities. The building shall be secured to prevent entry by any person after termination of workday. Durable equipment, such as power and hand tools, generators, and vehicles shall be cleaned monthly.
- B. Clean-up shall also include all paint chips and/or debris existing prior to the start of the contract and as generated during construction. This shall also include any paint that becomes dislodged and falls to the floor as a result of construction activities.
- C. Equipment shall be cleaned by HEPA vacuuming. Surfaces shall be maintained as free as practicable of accumulations of dust and debris. Clean up of dust and debris shall be accomplished with a HEPA vacuum or wet methods. The debris shall be misted with water with an airless type sprayer and collected with a mop or broom.

3.06 DISPOSAL OF WASTE MATERIAL

- A. General:

All costs associated with proper disposal of the waste materials (whether hazardous, non-hazardous or regulated) shall be borne by the Contractor under the Base Bid. All materials, whether hazardous, non-hazardous or regulated shall be disposed of in accordance with all laws, and the provisions of this Section and any or all other applicable federal, state county or local regulations and guidelines. It shall be the sole responsibility of the Contractor to assure compliance with all laws and regulations relating to disposal.

- B. Non-Hazardous Materials: The Contractor shall contact the regional EPA, State and local authorities to determine disposal requirements for construction and demolition debris that contains lead, cadmium or chromium (non-hazardous). The Contractor shall be responsible for providing all dumpsters/containers required for collection and disposal of such material as well as disposal in an approved landfill.
- C. Hazardous Waste/Regulated Materials: All materials which are determined to be hazardous waste or regulated waste for lead, cadmium or chromium shall be disposed of by the Contractor as specified herein. The Contractor shall perform representative Toxicity Characteristic Leaching Procedure (TCLP) tests of demolition debris to ensure the material is properly profiled for disposal. This shall also include all testing required by the disposal or recycling facility. All costs associated with TCLP testing to profile the waste material shall be borne by the Contractor. If the material is found to be hazardous waste or regulated waste, the Contractor shall provide appropriate drums/containers for use. The Contractor shall properly handle and transport all hazardous waste or regulated waste material into the drums/containers provided.
- D. All TCLP sampling and analysis shall be subject to approval by the Owner. A submittal shall be provided by the Contractor which details the procedures for the sampling including the name of the sampler, methodology for sample collection, sample preparation and chain-of-custody procedures. The laboratory to be used shall be certified by the State of Massachusetts and the American Industrial Hygiene Association (AIHA).
- E. No demolition or recyclable material shall be removed from the site unless approved by the Owner. The Contractor shall provide the name of the transporter and disposal facility for each type of waste (i.e. hazardous, non-hazardous, regulated or recyclable) for review and approval by the Owner.
- F. Recyclable/Salvaged Materials (Non-Hazardous): The Contractor shall note that any demolition material deemed to be recyclable or salvageable by the Contractor may contain lead, cadmium or chromium which could result in the recycling or salvage facility rejecting acceptance regardless of the lead, cadmium or chromium content or TCLP result. The Contractor is hereby notified of this fact and shall bear all responsibilities and costs associated with acceptance and/or rejection of such materials in a C&D landfill, waste disposal facility and/or a recycling/salvage facility under their Base Bid.
- G. The following materials are considered Hazardous Waste (Lead, Cadmium or Chromium) if they are generated in a form by themselves and shall be disposed of as such:
 - a. Paint chip and paint chip debris
- H. The Contractor shall be responsible for proper disposal of all materials outlined herein. In addition, all costs associated with worker protection or environmental protection requirements for such work shall be the responsibility of the Contractor.

END OF SECTION

SECTION 02.41.00

SELECTIVE DEMOLITION

I. PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. General and Supplementary General Conditions, Special Conditions and applicable parts of Division I as part of this Section.
- B. This Contractor must be familiar with all other Divisions and Sections of the Specifications which affect the work of this Section.

1.02 WORK INCLUDES

- A. Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following major items:
 - 1. Remove existing entry stoop, railing and footings.
 - 2. Removal and disposal or salvage of existing siding, trim as noted on the drawings.
 - 3. Removal and disposal of overhead doors to the rough opening. as noted on the drawings.
 - 4. Removal and disposal of exterior doors, as noted on the drawings, to the rough opening, including frames and hardware, interior casings and trim, thresholds and kick-boards as required to permit the installation of the new doors.
 - 5. Remove select wall interior cladding (Wallboard / T1-11) and framing as shown on the drawings to allow new repair work.
 - 6. Remove interior window trim.
 - 7. Coordinate removal of all electrical items with the Electrical Contractor per the related sections (Section 26.00.00).
 - 8. All other demolition work as indicated on drawings.
 - 9. Legal disposal off site of all demolished materials for all trades.

1.03 WORK BY OTHERS

- A. WPD to coordinate the removal of any items within the building required to perform the new work.

1.04 RELATED SECTIONS

- A. Section 01.22.00 - UNIT PRICES
- B. Section 01.50.00 - TEMPORARY FACILITIES AND CONTROLS
- C. Section 01.73.29 - CUTTING AND PATCHING for demolition work affecting interior finishes
- D. Section 01.74.19 - CONSTRUCTION WASTE MANAGEMENT for recycling requirements
- E. Section 02.06.20 - EXISTING CONDITIONS for information on items to be demolished
- F. Section 06.10.00 - ROUGH CARPENTRY for replacement of damaged materials
- G. Section 10.04.00 - SIDING ACCESSORIES for coordination of accessories to be replaced / reinstalled.

1.05 SUBMITTALS

- A. Refer to Section 01.33.00 - Submittals for submittal provisions and procedures.
- B. Schedule: Provide detailed sequence of demolition and removal work. The schedule shall interface to the overall project schedule and shall be approved by WPD prior to the start of any demolition.
- C. Prepare and submit the Comprehensive Waste Management form. Submit records of recycling and/or disposal as appropriate, including waste manifests for hazardous materials.
- D. Shoring design: if merited by the amount of materials to be demolished, the Contractor shall submit shoring designs prepared and stamped by a professional structural engineer, registered in Massachusetts.
- E. Qualifications of arborist, and of personnel performing work on lead paint and asbestos containing items.

1.06 JOB CONDITIONS

- A. Condition of Structures: Owner assumes no responsibility for actual condition of items or structures to be demolished.
- B. Access and Sequencing: The entire building will be vacant throughout the duration of the project. However, the adjacent buildings in the development will remain occupied. Provide QHA with adequate time to issue tenant notices prior to the start of work, as specified in Division 1.
- C. Protections: Provide temporary barricades and other forms of protection as required to protect Owner's personnel, tenants and the general public from injury due to selective demolition work.
 - 1. Provide protective measures as required to provide free and safe passage around the building, and around the site.
 - 2. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations. Protect site with suitable coverings when necessary.
 - 3. Remove protections at completion of work.
- D. Damages: Promptly repair all damages caused by demolition work at no cost to Owner.
- E. Traffic: Conduct selective demolition operations and debris removal in a manner to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.
- F. Do not close, block or otherwise obstruct streets, walks or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- G. Utility Services: Maintain existing utilities indicated to remain, keep in service, and protect against damage during demolition operations. Coordinate all utilities disconnects / change-overs with subcontractors for proper sequencing.

II. PART 2 - PRODUCTS (Not Applicable).

III. PART 3 - EXECUTION

3.01 INSPECTION

- A. Prior to commencement of selective demolition work, inspect areas in which work will be performed. Photograph existing conditions to structure surfaces, equipment or to surrounding properties which could be misconstrued as damage resulting from selective demolition work; file with Architect prior to starting work.
- B. Confirm that the work from Section 02.08.00 and 02.08.10 is complete prior to associated work on site.

3.02 COORDINATION

- A. Coordinate access to the building with WPD.
- B. Coordinate the work of all trades to maximize forward progress of the project and sequence the work so that new work will be properly protected from weather and remaining work.

3.03 PREPARATION

- A. Submit schedules with proper advance notice, as required by Section 01.33.00.
- B. Provide temporary protections as specified in Section 01.50.00.
- C. Coordinate the removal or disconnection of all Electrical items as required, by licensed contractors, though such work is not anticipated for this project.
- D. Prune back bushes if required to perform demolition. Coordinate extent of pruning with WPD prior to start of work. Take reasonable measures to protect tenant's flower gardens and plantings, as work progresses.

3.04 GENERAL DEMOLITION

- A. Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on Drawings in accordance with demolition schedule and governing regulations.
- B. Demolish materials in a careful manner, so as not to disturb or damage materials scheduled to remain, or not scheduled for demolition. Provide test cuts or inspectional demolition of small areas as required to verify the presence of hidden materials that could be damaged by demolition operations. Repair or make good any materials not scheduled for demolition that become damaged by construction operations.
- C. Do not perform more demolition than can be made weather-tight that same day.
- D. If unanticipated mechanical, electrical or structural elements which conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Designer in written, accurate detail. Pending receipt of directive from Designer, rearrange selective demolition schedule as necessary to continue overall job progress without delay.
- E. Notify Architect immediately if materials scheduled to remain are found to be unsuitable for the installation of the new work, or if existing conditions deviate substantially from those shown on the drawings. Remove and replace, or make good, any existing materials unsuitable for installation of new work.
- F. Segregate and recycle demolished materials where possible, and in accordance with Section 01.74.19 - Construction Waste Management.

3.05 SIDING AND TRIM DEMOLITION

- A. Remove all materials scheduled and specified for demolition, to fully reveal the exterior of the wall framing. Inspect the sheathing and perform the following:
 - 1. Where removal of damaged sheathing reveals damaged framing behind, such conditions shall be corrected before proceeding with new work.
 - (a) The contractor shall include in the bid, completely re-framing the wall area below an existing windows (2x4 top plate, cripple studs, 48" of jack and king studs and portion of bottom plate) **(The GC shall carry the removal, furnishing and installation of (4) such window areas as specified in section 06.10.00.)**
 - (b) The contractor shall include in the bid, an additional quantity of **replacing 2x4 studs**, for incidental repairs where revealed elsewhere **(The GC shall carry the removal, furnishing and**

installation 2x4 framing as specified in section 06.10.00 and in the Unit Price Section).

Repairs of studs may be made by sistering new wood to old, as long as new work can be securely fastened to old. Rotted materials shall be removed, a repair stud installed, and a sister stud installed straddling the repair.

- (i) Sheathing boards shall be cut back to the studs on either side of the stud being replaced.
 - (ii) Sound boards may be salvaged and reinstalled
 - (iii) Large areas may be re-sheathed with plywood rather than boards, at the contractor's discretion.
- (c) Framing materials shall meet the specification requirements of 06.10.00 - ROUGH CARPENTRY.
2. Where repairs are performed, the contractor shall replace the existing insulation with new fiberglass batt insulation to completely fill the stud area where disturbed. The amount carried in the base bid shall match the square footage of the sheathing to be replaced. Batt insulation as specified in 06.10.00 - ROUGH CARPENTRY
3. Salvage items as directed for reinstallation.

3.06 DOORS

- A. Coordinate demolition to coincide with other work on the building. Do not begin demolition until new windows and doors are available on site, and ready for reinstallation.
- B. Remove windows and doors to the extent detailed, or back to rough openings if not detailed.
- C. Inspect framed opening or other conditions scheduled to receive new items for soundness or damage. Advise Project Representative if unsuitable materials are encountered and require replacement. Make minor corrections to squareness of openings prior to installing new work, and re-secure loose boards.
- D. Do not remove a unit that cannot be replaced that same day.

3.07 CONCRETE STOOPS AND RAILINGS

- A. Perform demolition of concrete in conformance with the methods and procedures established by the International Concrete Repair Institute (ICRI), Concrete Repair Manual, 3rd Edition.
- B. Remove concrete / masonry stoops, associated railings, etc, in a systematic manner as not to damage the existing foundation or any other materials scheduled to remain.

3.08 INTERIOR DEMOLITION

- A. Coordinate the disconnection of live plumbing to sinks and other fixtures, by FSBER prior to removal. Salvage for the Housing Authority.
- B. Systematically remove all the interior finishes / trim scheduled to be removed.
- C. Remove interior framing scheduled to be removed.
- D. Remove any damaged rotted framing so it can be replaced in kind.

3.09 SALVAGE OF ITEMS

- A. Prior to the start of demolition, the Contractor shall review the building with the Owner to identify any additional items to be salvaged. The Contractor shall also coordinate with all sub-bidder for items to be salvaged. The contractor shall salvage any items directed by the Owner, and place them on site where directed by the Owner or reinstalled as specified.
- B. Dispose of any other items being demolished, as directed by Owner.

3.10 DISPOSAL OF DEMOLISHED MATERIALS

- A. Segregate and recycle per the Construction Waste Management and Disposal Section Waste Management Section 01.74.19
- B. Remove debris, rubbish and other materials resulting from demolition operations from building site. Transport and legally dispose of materials off site.
- C. Dispose of hazardous materials as required by applicable regulations, laws, and ordinances concerning removal, handling and protection against exposure or environmental pollution.
- D. If hazardous materials beyond those identified for removal are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling and protection against exposure or environmental pollution.
- E. Burning of removed materials is not permitted on project site.

3.11 CLEAN-UP AND REPAIR

- A. Upon completion of demolition work, remove tools, equipment and demolished materials from site. Remove protections and leave area broom clean.
- B. Repair demolition performed in excess of that required at no cost to the Owner. Return structures and surfaces to remain to condition existing prior to commencement of selective demolition work. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.
- C. Any damages to existing furnishings and/or equipment, shall be reimbursed by the general contractor, who shall recoup costs from other contractors as appropriate.
- D. Repair any utilities damaged by demolition procedures, in a manner as directed by the Owner.

3.12 CLOSE-OUT

- A. Record on the as-built drawing set, all areas which received new framing or sheathing, and any utilities which were cut back or abandoned.

END OF SECTION
02.41.00

SECTION 03.30.00

CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS

- A. The 00.72.00 **Conditions of the Contract** and all sections of **Division 01**, General Requirements shall be part of this section unless otherwise specifically excluded.
- B. This Contractor must be familiar with all other Divisions and Sections which affect this Work.

1.2 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. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mix design, placement procedures, and finishes.
- B. **Alternate:** N/A
- C. **Items to Be Installed Only:** Install the following items as furnished by the designated Sections
 - 1. None. All items to be installed by this trade, shall be furnished by this trade.
- D. **Items to Be Furnished Only:** Furnish the following items for installation by the designated Sections:
 - 1. None
- E. **Related Work Specified Elsewhere:** The following items are not included in this Section, and will be performed under the designated Section:
 - 1. N/A

1.3 DEFINITIONS

- A. **Cementitious Materials:** Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

1.4 SUBMITTALS

- A. **Product Data:** For each type of manufactured material and product indicated.
- B. **Design Mixes:** For each concrete mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mix water to be withheld for later addition at Project site.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for formwork and shoring and reshoring installations that are similar to those indicated for this Project in material, design, and extent.
- C. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
 - 1. Manufacturer must be certified according to the National Ready Mixed Concrete Association's Certification of Ready Mixed Concrete Production Facilities.
- D. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- E. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.
- F. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code-- Reinforcing Steel."
- G. ACI Publications: Comply with the following, unless more stringent provisions are indicated:
 - 1. ACI 301, "Specification for Structural Concrete."
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle steel reinforcement to prevent bending and damage.
 - 1. Avoid damaging coatings on steel reinforcement.
 - 2. Repair damaged epoxy coatings on steel reinforcement according to ASTM D 3963/D 3963M.

2PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type II.
- B. Blended Hydraulic Cement: ASTM C 595M, Type IP, portland-pozzolan cement.
- C. Normal-Weight Aggregate: ASTM C 33, uniformly graded, and as follows:
 - 1. Class: Moderate weathering region, but not less than 3M.
 - 2. Nominal Maximum Aggregate Size: 3/4 inch.
 - 3. Combined Aggregate Gradation: Well graded from coarsest to finest with not more than 18 percent and not less than 8 percent retained on an individual sieve, except that less than 8 percent may be retained on coarsest sieve and on No. 50 sieve, and less than 8 percent may be retained on sieves finer than No. 50.
- D. Water: Potable and complying with ASTM C 94.

2.4 CURING MATERIALS

- A. Water: Potable.

2.5 RELATED MATERIALS

- A. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

2.6 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

3PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch.

2. Class B, 1/4 inch.
3. Class C, 1/2 inch.
4. Class D, 1 inch.

D. Construct forms tight enough to prevent loss of concrete mortar.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
1. Install anchor bolts, accurately located, to elevations required.
 2. Install reglets to receive top edge of foundation sheet waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 3. Install dovetail anchor slots in concrete structures as indicated.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
1. Shop- or field-weld reinforcement according to AWS D1.4, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire fabric in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.5 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement, unless approved by Architect.
- C. Before placing concrete, water may be added at Project site, subject to limitations of ACI 301.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mix.

- D. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation.
- E. Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Place each layer while preceding layer is still plastic, to avoid cold joints.
1. Consolidate placed concrete with mechanical vibrating equipment. Use equipment and procedures for consolidating concrete recommended by ACI 309R.
 2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the vibrator. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix constituents to segregate.
- F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement.
 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 4. Slope surfaces uniformly to drains where required.
 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- G. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.
- H. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot-weather conditions exist:
1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.6 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched. Remove fins and other projections exceeding ACI 347R limits for class of surface specified.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch in height.
 - 1. Apply to concrete surfaces to be covered with a coating or covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, or painting.
 - 2. Do not apply rubbed finish to smooth-formed finish.
- C. Rubbed Finish: Apply the following to smooth-formed finished concrete:
 - 1. Apply to concrete surfaces exposed to public view.
 - 2. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.7 FINISHING SLABS

- A. General: Comply with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Broom Finish (Stoops and landings): Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
 - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.8 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete Work.

3.9 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.
- B. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing by one or a combination of the following methods:

C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.

3.10 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and

expose steel reinforcement with at least 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

END OF SECTION
03.30.00

SECTION 03.33.00
CONCRETE REPAIRS

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

- A. General and Supplementary General Conditions, Special Conditions and applicable parts of Division I as part of this Section.
- B. This Contractor must be familiar with all other Divisions and Sections of the Specifications, which affect the work of this Section.
- C. **Alternates:** N/A

1.02 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) Preparation and repairs to existing concrete foundation / balconies, including:
 - (a) Hairline cracks
 - (b) Spalled and missing concrete
 - (c) Patching voids.

1.03 RELATED SECTIONS:

- A. Related Work: The following items are not included in this Section and will be performed under the designated Sections
 - (1) Section 02.41.00 - Selective Demolition
 - (2) Section 03.33.00 – Cast-in Place Concrete
 - (3) Section 06.10.00 – Rough Carpentry

1.04 DEFINITIONS:

- A. Cracks: separations in concrete running more or less perpendicular to the face of the concrete. Cracks may range in width, but are characterized by intact concrete on either side.
- B. Spalls: areas of damaged concrete where portions have separated and fallen off the building, or have separated and are in danger of falling off the building. Spalls are characterized by cracks that run more or less parallel to the face of the concrete.
- C. Honeycomb: areas of concrete which were not properly consolidated prior to curing, resulting in depressed areas, typically with visible aggregate.

1.05 SUBMITTALS

- A. Product Data: For each type of product indicated. Data shall clearly indicate manufacturer's recommended preparation and application requirements.
- B. Samples: submit samples of cured materials, to determine if color matching repair products to existing in-place construction is desired. Where custom colors are available, submit the proposed custom color match for review and approval.
- C. Maintain copies of MSDS sheets on site, for all approved materials.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: ISO 9001 Certified and have in existence a recognized ongoing quality assurance program independently audited on a regular basis.
- B. Contractor Qualifications: Contractor shall be qualified in the field of concrete repair and protection with a successful track record of 5 years or more. Contractor shall maintain qualified personnel who have received product training by the appropriate manufacturers' representatives.
- C. Install materials in accordance with all safety and weather conditions required by manufacturer or as modified by applicable rules and regulations of local, state and federal authorities having jurisdiction and Material Safety Data Sheets.
- D. Comply with ICRI procedures and standards.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.
- B. Patching Materials: Deliver and store as recommended by manufacturers, but at a minimum, deliver is original, unopened containers with manufacturer's name, labels, product identification and batch numbers, and store all materials off the ground, and protected from rain, excessive heat and freezing.

C. JOB CONDITIONS

1. Environmental Conditions: Do not apply materials if it is raining or snowing, or if such conditions appear to be imminent. Follow manufacturers' requirements for minimum/maximum application temperatures.
2. Protection: Precautions should be taken to avoid damage to surfaces near the work zone due to mixing and handling of the specified materials.

1.08 WARRANTY

- A. Patching Materials: manufacturer's minimum five (5) year warranty against material defects.
- B. Contractor's Warranty: one (1) year, labor and materials to replace any defective repairs installed under this project.

PART 2 - PRODUCTS

2.01 CONCRETE REPAIR MATERIALS

- A. Patching Mortar for spalls: Sika Corporation “**Sikatop 123 Plus**”, or approved equal polymer modified non-sag mortar specifically engineered for the repair of concrete surfaces, meeting or exceeding the following criteria: (Approved equals by Equal systems produced by BASF, 3M or another approved manufacturer meeting the performance criteria specified herein, will be acceptable.)
1. Must contain an integral penetrating corrosion inhibitor, meeting ASTM G 109 for corrosion reduction.
 2. Flexural Strength (ASTM C-293 modified): 2,000 psi @ 28 days.
 3. Splitting Tensile Strength (ASTM C-496): 900 psi @ 28 days.
 4. Bond Strength (ASTM C-882 modified): 2,200 psi @ 28 days.
 5. Compressive Strength (ASTM C-109): 7,000 PSI @ 28 days.
 6. Freeze-thaw resistance (ASTM C-666): 300 cycles, 98%.
- B. Patching Mortar for honeycombs: Sika Corporation “**SikaRepair 223**”, or approved equal one component early strength gaining cementitious patching material, suitable for use in vertical and overhead applications.
1. Compressive Strength (ASTM C-109): 3,000 psi at 1 day, 6,000 psi at 7 days and 7,000 psi at 28 days.
 2. Flexural Strength (ASTM C-293): 850 psi at 28 days.
 3. Bond Strength (ASTM C-882): 1,800 psi at 28 days.
 4. Splitting Tensile Strength (ASTM C-496): 550 psi at 28 days.
 5. Materials shall be placeable from ¼” to 1 ½” per lift in depth for either vertical or overhead applications.
- C. Bonding Agent / Reinforcement Protection: for use prior to placement of cementitious patching materials, and on areas of exposed reinforcing (existing and new): Sika Corporation “**Sika Armatec 110 EpoCem**”, or approved equal epoxy modified cementitious bonding agent, meeting the following performance criteria:
1. Product shall be specifically engineered to work with the patching mortars to be used. Wherever possible, bonding agent shall be produced by the manufacturer of the patching mortar. Where not possible, the patching mortar manufacturer shall state in writing that the proposed third-party bonding agent is acceptable for use with their product.
 2. Product must be suitable for bonding new concrete to old, and must offer corrosion resistance to reinforcing steel
 3. Shall develop compressive strengths per ASTM C-109 as follows: 4500psi @ 3 days, 6500psi @ 7 days and 8500psi @ 28 days.
 4. Shall produce a bond strength between old and new concrete of 2600psi (open time) per ASTM C882.
 5. Shall produce a bond strength (pullout test) between reinforcing steel and concrete, of 625psi.
- D. Epoxy for crack repair: Sika Corporation “**Sikaflex – 2c NS**”, Two-component, non-sag, polyurethane elastomeric sealant, or approved equal 2-component low viscosity epoxy resin, meeting ASTM aC-290 and the following performance criteria:
1. Product must be suitable for injection, or gravity application, and able to be placed on damp substrates.
 2. Tensile strength of 7200psi @ 7 days per ASTM D-638
 3. Bond strength of 1,300 psi @ 14 days (hardened concrete to hardened concrete) per ASTM C-882
 4. Compressive strength @ 73°F, per ASTM D-695 of: 1,450psi @ 1 day, 9,600psi @ 3 days, 11,800psi @ 7 days and 13,000psi @ 28 days.

- E. Water: shall be from approved source, potable, clean and free from oils, acids, alkali, organic matter and other deleterious material.

2.02 FORM MATERIALS

- A. Form materials should not be required for the application of the specified products. Patching mortars shall be placed in lifts, with scratch coats between lifts, and not placed as large, single repairs.

2.03 REINFORCEMENT AND ACCESSORIES

- A. Reinforcing Steel Bars: shall be newly rolled billet steel conforming to ASTM A615 Grade 60. Bars shall be bent cold.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Contract drawings indicate the general vicinity and type of damage to be repair. The contractor shall inspect areas to be repaired prior to the start of work, and confirm the extent and type of repair required.
- B. The extent of repairs to cracks shall be as required to deliver a suitable substrate to receive fluid waterproofing being applied by the waterproofing filed sub-bidder. This contractor shall become familiar with the substrate requirements of the approved waterproofing submittal, prior to repairs, and shall coordinate with the waterproofing filed sub-bidder as appropriate.

3.2 HANDLING, STORAGE, AND PROTECTION OF MATERIALS

- A. Handle and store materials separately in such manner as to prevent intrusion of foreign matter, segregation, or deterioration. Do not use foreign materials or those containing ice. Remove improper and rejected materials immediately from point of use. Cover materials, including steel reinforcement and accessories, during construction period. Stockpile concrete constituents properly to assure uniformity throughout project.

3.3 PREPARATION

- A. Prepare all areas to receive new work, as required by the manufacturer of the repair products to be used. At a minimum, this will include:
 - 1. Removing all loose materials from damaged areas. Grinding or saw cutting edges of repair area, to provide an inverted vee or back-bevel.
 - 2. Cleaning rust from all exposed reinforcement, by tool, returning steel to bright metal. Where corrosion has reduced reinforcement diameter to ½ the original size or less, such reinforcement shall be removed back to suitable material.
 - 3. Removing all foreign materials that would compromise the bond of new materials, including dirt, grease, vegetation, paint, and other unsuitable materials by mechanical means.
 - 4. Roughening or scarifying areas to receive repairs.
- B. Where preparation of deteriorated materials would compromise the structural integrity of the construction, the Contractor shall first erect supports or shoring, or otherwise stabilize the construction as required, before proceeding.
- C. Advise the Resident Engineer when preparation work had been completed, prior to proceeding with new work.

- D. Protect adjacent construction not receiving work, from damage or disfiguration from repair materials. Clean spills or spatter immediately.
- E. Dry areas to receive repairs as required, using compressed air, fans or heaters, to deliver the field conditions required by the manufacturer of the repair product. Once dry, protect repair areas as required, until repairs can be effected.
- F. Consult manufacturer's installation instructions to determine acceptable application temperatures for products being used. Postpone application of new materials, or adjust temperatures within repair areas with temporary heat/cooling, as required by manufacturer.

3.4 PLACING OF REINFORCEMENT

- A. Where rusted reinforcement requires removal, new reinforcement shall be placed in accordance with requirements of CRSI 93, "Recommended Practice for Placing Reinforcing Bars" and CRSI 93, "Recommended Practice for Placing Bar Supports" and with further requirements below.
- B. Reinforcement shall be accurately placed and shall be firmly secured in position by wire ties, chairs, spacers, hangers, or cored and set in place, each of type approved by Designer.
- C. Bending, welding or cutting reinforcement in field in any manner other than as shown on Drawings, is prohibited, unless specific approval for each case is given by Designer.
- D. New reinforcement shall be continuous lengths.
- E. Reinforcement shall be spliced over existing reinforcement left in place. Lap bars a minimum of 40 bar diameters, and wire-tie new reinforcing to old.
- F. At time concrete is placed, reinforcement shall be free of excessive rust, scale, or other coatings that will destroy or reduce bond requirements. Schedule repairs so that reinforcement is not exposed to weather for a considerable length of time; protect from corrosion as required. Protect stored materials so as not to end or distort bars in any way. Bars that become damaged will be rejected.
- G. Before concrete is cast, check all reinforcement after it is placed to insure that reinforcement conforms to Contract Documents and approved Shop Drawings. Such checking shall be done only by qualified experienced personnel. In addition, the Designer shall be notified at least 36 hours prior to concrete placement and given opportunity to inspect completed reinforcement and formwork before concrete placement. Prior approval of Shop Drawings shall in no way limit Designer's right to demand modifications or additions to reinforcement or accessories.

3.5 CRACK REPAIR

- A. Repair cracks larger than 1/8" in width, with patching mortar for spalls, as specified herein.
- B. Repair cracks less than 1/8" in width, using low viscosity epoxy, by gravity feed or injection as conditions permit.
- C. Apply products as required by manufacturer, completely filling crack to be repaired.

3.6 SPALL AND HONEYCOMB REPAIRS

- A. Scrub material into area to be repaired, to consolidate it and eliminate any air pockets. Screed off final lift, and finish to match texture of adjacent concrete.

- B. Mix patching mortar following manufacturer's instructions. Mix only enough product as can be placed within the open time noted on the manufacturer's technical literature.
- C. Place repair material as required by manufacturer, taking care not to exceed the maximum liftdepth. Where multiple lifts are required, scratch repair material after initial set, to provide a roughened surface for the next lift to bond to. Allow lifts to set as required by manufacturer, before placing the next lift.
- D. Moist cure repair areas with water, for the duration recommended by the manufacturer.

3.7 PROTECTION

- A. When concrete is placed at or below ambient air temperatures of 40 degrees F. or whenever in opinion of Designer, such or lower temperatures are likely to occur within 48 hours after placement of concrete, cold weather concreting procedures, according to ACI 306 and as specified herein, shall be followed. To this end, entire area affected shall be protected by adequate housing or covering, and heating. No salt, chemicals or other foreign materials shall be used in the mix to lower freezing point of concrete.
- B. Protect concrete work against injury from heat, cold, and defacement of any nature during construction operations.
- C. Curing compounds will not be permitted for concrete repairs.
- D. Keep permanent temperature record showing date and outside temperature for concreting operations. Thermometer readings shall be taken at start of work in morning, at noon, and again late in afternoon. Locations of concrete placed during such periods shall likewise be recorded, in such manner as to show any effect temperatures may have had on construction. Copies of temperature record shall be distributed daily to Designer.

3.8 CLEANING

- A. Concrete surfaces shall be cleaned of objectionable stains as determined by the Designer. Materials containing acid in any form or methods which will damage "skin" of concrete surfaces shall not be employed, except where otherwise specified.
- B. Remove all temporary supports, shoring or other items installed to facilitate the repairs. Patch any holes in construction.
- c. Patches, which become crazed, cracked or sound hollow upon tapping shall be removed and replaced with new material at the Contractor's expense.

END OF SECTION
03.33.00

SECTION 06.10.00

ROUGH CARPENTRY

I. PART 1 - GENERAL

1.01 GENERAL

- 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.

1.02 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. Wood blocking, cants, nailers, fasteners
 2. Replacement framing members
 3. Entry porch framing members
 4. Plywood materials
 5. Exterior composite decking materials
 6. PVC Railing System
 7. Fasteners
- B. **Alternates:** N/A
- C. **Items to Be Installed Only:** Not Applicable.
- D. **Items to Be Furnished Only:** Furnish the following items for installation by the designated Sections:
1. N/A.
- E. **Related Work Specified Elsewhere:** The following items are not included in the Section, and will be performed under the designated Section:
1. Section 02.41.00 - SELECTIVE DEMOLITION for removal of existing rough carpentry items.

1.03 SUBMITTALS

- A. **Product Data:** For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials, both before and after exposure to elevated temperatures when tested according to ASTM D 5516 and ASTM D 5664.
 3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 4. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels; place spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

1.05 WARRANTIES

- A. Furnish manufacturer's standard warranty providing coverage against checking, splitting, splintering, rotting, structural damage from termites, and fungal decay of composite wood.
- B. PVC Products:
 - 1. Provide manufacturer's 25 year warranty against defects in manufacturing that cause the products to rot, corrode, delaminate, or excessively swell from moisture.
- C. Installer's Warranty:
 - 1. 1 year labor and materials on all products installed.

II. PART II - PRODUCTS

2.01 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 - 3. Provide dressed lumber, S4S, unless otherwise indicated.
 - 4. Provide dry lumber with 15 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.
- B. Plywood:
 - 1. Plywood: Either DOC PS 1 or DOC PS 2, unless otherwise indicated.
 - 2. Thickness: As needed to match thickness indicated match adjacent.
 - 3. Factory mark panels according to indicated standard.
- C. Boarding:
 - 1. American Lumber Standard Committee, No. 2 grade or better.

2.02 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPA C2 (lumber) and AWPA C9 (plywood), except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and not containing arsenate.
- B. Kiln-dry material after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark each treated item with the treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.

- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete in exterior walls.

2.03 MISCELLANEOUS LUMBER

- A. General: Provide lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Cants.
 - 3. Nailers.
- B. For items of dimension lumber size, provide Construction, Stud, or No. 2 grade lumber.

2.04 PANEL PRODUCTS

- A. Sheathing: Exterior Type, Standard Grade with exterior glue; Douglas Fir, 5 ply thickness to match the existing sheathing. Note: 4 ply, southern yellow pine plywood is not acceptable.
- B. Plywood Grading: Comply with Product Standard PS 1, "Construction and Industrial Plywood".
- C. Certification and Marking: The producer shall include a Certificate of Inspection with each shipment. Grade mark each panel in compliance with applicable standards of Product Standard PS 1.
- D. Moisture Content: Provide plywood which has been seasoned by kiln drying to a moisture content not to exceed 19%.
- E. Thickness:
 - 1. Where used to patch or infill existing openings in sheathing, match existing adjacent.

2.05 COMPOSITE DECKING BOARDS:

- A. Trex "Enhance", Fiberon "Horizon", Latitudes "Captiva" or approved equal by meeting the following:
 - 1. Composition: Reclaimed wood and plastic with integral coloring; free from toxic chemicals and preservatives.
 - 2. Profiles:
 - (a) Decking: Nominally 5/4 x 6 inches x maximum practical length.
 - (b) Fascia, risers, and trim: Nominally 1 x 8 or 1 x 12 x maximum practical length.
 - 3. Surface texture: Woodgrain.
 - 4. Colors: to be selected by Owner, from full range of colors available.
 - 5. Composite wood decking shall be face screwed with color match / coated screws provided by or approved by the decking manufacturer for the profile and product being fastened.
 - 6. Characteristics:
 - (a) Abrasion resistance: 0.01 inch wear per 1000 revolutions, tested to ASTM D2394.
 - (b) Hardness: 1124 pounds, tested to ASTM D143.
 - (c) Self ignition temperature: 743 degrees F, tested to ASTM D1929.
 - (d) Flash ignition temperature: 698 degrees F, tested to ASTM D1929.
 - (e) Flame spread rating: 80, tested to ASTM E84.
 - (f) Water absorption, 24 hour immersion, tested to ASTM D1037:
 - (i) Sanded surface: 4.3 percent.
 - (ii) Unsanded surface: 1.7 percent.

- (g) Thermal expansion coefficient, 36 inch long samples:
 - (i) Width: 35.2×10^{-6} to 42.7×10^{-6} .
 - (ii) Length: 16.1×10^{-6} to 19.2×10^{-6} .
- (h) Fastener withdrawal, tested to ASTM D1761:
 - (i) Nail: 163 pounds per inch.
 - (ii) Screw: 558 pounds per inch.
- (i) Static coefficient of friction:
 - (i) Dry: 0.53 to 0.55, tested to ASTM D2047.
 - (ii) Dry: 0.59 to 0.70, tested to ASTM F1679.
 - (iii) Wet: 0.70 to 0.75, tested to ASTM F1679.
- (j) Fungus resistance, white and brown rot: No decay, tested to ASTM D1413.
- (k) Termite resistance: 9.6 rating, tested to AWPA E-1.
- (l) Specific gravity: 0.91 to 0.95, tested to ASTM D2395.
- (m) Compression:
 - (i) Parallel: 1806 PSI ultimate, 550 PSI design, tested to ASTM D198.
 - (ii) Perpendicular: 1944 PSI ultimate, 625 PSI design, tested to ASTM D143.
- (n) Tensile strength: 854 PSI ultimate, 250 PSI design, tested to ASTM D198.
- (o) Shear strength: 561 PSI ultimate, 200 PSI design, tested to ASTM D143.
- (p) Modulus of rupture: 1423 PSI ultimate, 250 PSI design, tested to ASTM D4761.
- (q) Modulus of elasticity: 175,000 PSI ultimate, 100,000 PSI design, tested to ASTM D4761.
- (r) Thermal conductivity: 1.57 BTU per inch per hour per square foot at 85 degrees F, tested to ASTM C177.

2.06 PVC RAILING SYSTEM

- A. All components of the railing shall be part of a complete system and the system shall meet all applicable code requirements. Acceptable system manufactures are:
 - 1. Azek: "Trademark" Railing system
 - 2. Trex: "Select"
 - 3. Veranda: "Regency Composite Railing" system
 - 4. Or approved equal meeting the specifications of the products listed.
- B. The railing system shall include, but not be limited to the following:
 - 1. Railing: Top and bottom shall be composite, rails shall be shall have with smooth square balusters and matching baluster spacer.
 - 2. Post: 4"x 4" PT post, mounting plate / brackets / lag bolts, smooth post cover and hardware, shoe / base molding and post cap .
 - 3. Additional Hardware: all required rail-to-post brackets, fasteners, anchors and covers to install the system per the manufacturers' instructions and as detailed.
- C. Color of all visible components shall be: White.
- D. The railing system components shall have a composite core with a PVC or Acrylic exterior facing layer.
- E. Railing system shall be certified by manufacturer to resist the horizontal loads required by 780 CMR.

2.07 FLASHING AND CAPS:

- A. Aluminum coil stock or sheet, minimum 0.024" thickness, coated, may be used where not in contact with cementitious or preserved wood products. Aluminum will be allowed in these areas if separated by ice and water shield. Any proposed fabric flashing will need to be reviewed and approved.
- B. Zinc or lead coated copper sheet, minimum 16oz.

- C. Ice and water shield underlayment where flexible flashings are required.

2.08 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - 1. Where carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Wire, Brads, and Staples: FS FF-N-105.
- C. Power-Driven Fasteners: CABO NER-272.
- D. Wood Screws: ASME B18.6.1.

III. PART III - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Discard units of material with defects that impair quality of carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.
- B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- C. Apply field treatment complying with AWWPA M4 to cut surfaces of preservative-treated lumber and plywood.
- D. Securely attach carpentry work as indicated and according to applicable codes and recognized standards.
- E. Countersink fastener heads on exposed carpentry work and fill holes with wood filler.
- F. Use fasteners of appropriate type and length. Pre-drill members when necessary to avoid splitting wood.

3.02 WOOD FRAMING, BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.
- C. Where removal of existing materials reveals damaged members that are not suitable to remain, remove and replaced the damaged members back to the adjacent framing.

3.03 SHEATHING REPAIRS

- A. Where wall penetrations / openings are removed, cut back sheathing to the nearest framing members, and infill the area to be patched with new material matching adjacent.

- B. Where removal of existing materials reveals damaged sheathing not suitable for receiving new work, remove and replaced the damaged areas back to the adjacent framing.
- C. At all areas being patched, scab framing lumber to the rafter/truss to support the new sheathing.
- D. Contractors may elect to use boarding or plywood to patch areas, as conditions dictate.

3.04 COMPOSITE DECKING

- A. Install composite wood in accordance with manufacturer's instructions.
- B. Cut, drill, and rout composite wood using carbide tipped blades.
- C. Pre-drill fastener holes located closer than 1 inch from edges.
- D. Cut ends square and true.
- E. Do not use composite wood products as structural members.
- F. Do not exceed maximum spans recommended by manufacturer.
- G. Place boards perpendicular to supports.
- H. No joints are permitted between boards, all board runs shall be from a single piece.
- I. Leave expansion spaces between abutting boards and between boards and adjacent construction as recommended by manufacturer, or as follows:
 - 1. End gaps between boards: 1/8 inch at ambient temperatures of 60 degrees F and above and 3/16 inch at ambient temperatures below 60 degrees F.
 - 2. Side gaps between boards: shall be a maximum of 1/4" at ambient temperatures below 60 degrees F.
 - 3. Gaps between boards and adjacent construction: 1/4 inch at ambient temperatures of 60 degrees F and above and 1/2 inch at ambient temperatures below 60 degrees F.
- J. Fasten each board to each support with two fasteners.
- K. Mitre perimeter boards as detailed. Notch and scribe boards to posts, walls and other construction interrupting runs of boards, to minimize visibility of gaps.

3.05 PVC RAILING SYSTEM

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Fasten the railing system per the drawing details and the system manufacturer's instructions.

3.06 CLEANING

- A. Clean composite wood to remove stains.
- B. Mold, mildew, and berry and leaf stains: Clean surfaces with conventional deck wash containing detergent or sodium hypochlorite.
- C. Rust and ground-in dirt: Clean surfaces with cleaner containing oxalic or phosphoric acid.
- D. Oil and grease: Clean surfaces with detergent containing de-greasing agent.

END OF SECTION
06.10.00

SECTION 07.20.00

INSULATION

I. PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

- A. The General Conditions, Supplementary General Conditions, and applicable parts of Division I as part of this Section.
- B. This Contractor must be familiar with all other Divisions and Sections which affect this Work.

1.02 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. Batt insulation walls and attic
- A. **Items to Be Installed Only:** Install the following items as furnished by the designated Sections:
 - 1. None. All items to be installed by this trade, shall be furnished by this trade.
- B. **Items to Be Furnished Only:** Furnish the following items for installation by the designated Sections:
 - 1. None.
- C. **Related Work Specified Elsewhere:** The following items are not included in the Section, and will be performed under the designated Section:
 - 1. N/A

1.03 REFERENCES

- A. 780 CMR, Massachusetts State Building Code, 9th Edition, Massachusetts Amendments
- B. International Energy Conservation Code (IECC) 2012 and Appendix AA (Stretch Energy Code)
- C. ASTM C 665
- D. ASTM E96, vapor transmission, desiccant method
- E. ASTM C 518
- F. UL D369

1.04 SUBMITTALS

- A. Submit in accordance with Section 01.33.00.

1.05 QUALITY ASSURANCE

- A. Performance requirements of exterior envelope shall conform to 2015 IECC, 9th Edition MSBC.
- B. Insulation and barrier installation techniques shall conform to 2015 IECC, 9th Edition MSBC.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect stored materials from damage and moisture, before, during and after installation.

II. PART 2 PRODUCTS

2.01 SPRAY FOAM

- A. Spray Foam Insulation: low pressure polyurethane expanding foam sealant meeting ASTM C 1620 and passing AAMA 812 for use at doors and windows. Manufacturer must be able to supply an ICC-ES report indicating product complies with 2015 IBC requirements.

2.02 WALL

- A. Fiberglass batts complying with ASTM C 665, Type I and ASTM E136
 1. Type: Faced
 2. Thickness: 3 ½"
 3. Min 3.5R per inch, as tested by ASTM C 518, Refer to drawings for locations.

2.03 ATTIC

- A. Fiberglass batts complying with ASTM C 665, Type I and ASTM E136
 1. Type: unfaced
 2. Thickness: As required to meet R49

III. PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and openings are ready to receive work and field measurements are as shown on shop drawings.
- B. Verify that mechanical, electrical, and building items affecting work of this Section are placed and ready to receive this work.
- C. Verify that the roof is watertight before installing insulation.
- D. Beginning of installation means acceptance of existing conditions.

3.02 PREPARATION

- A. Verify that framing is straight and true, and ready to receive the work of this section.
- B. Correct any defects prior to installation of new materials.

3.03 INSTALLATION

- A. Batt Insulation
 3. Friction fit batts between joists and studs. Batt shall fit neatly and be cut to fit smaller cavities. Fit insulation neatly and fully around all cavity utilities. Install spray foam at any areas that are too small to insulate properly.
 4. Secure kraft paper tabs to framing where faced insulation is specified and temporarily secure unfaced insulation in place with strapping, wires or other means if required, to support insulation until finish can be applied.
 5. Use continuous lengths of insulation, wherever possible. Where multiple lengths are required, butt batts together to eliminate any joints.
 6. Insulation of cavities which will be concealed through the process of framing, should be performed by the framing installers as that work progresses.
 7. In the attic space, if more than one layer of insulation is to be installed (to meet R49) the second layer shall be installed perpendicular to the first layer.

3.04 ADJUSTMENT, CLEANING AND PROTECTING.

- A. Inspect and adjust and loose or damaged ceiling insulation prior to installation of ceiling finish.
- B. Inspect and repair any defects or damage in barriers, prior to installation of wall finishes.

END OF SECTION
07.20.00

SECTION 07.46.00

SIDING AND TRIM

I PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

- A. The General Conditions, Supplementary General Conditions, and applicable parts of Division I as part of this Section.
- B. This Contractor must be familiar with all other Divisions and Sections which affect this Work.

1.02 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.) Wood siding
 - (2.) Wood trim / soffit
 - (3.) Backer boards for wall mounted accessories
 - (4.) Metal flashing
 - (5.) Sealants
- B. **Alternates:** N/A
- C. **Items to Be Installed Only:** Install the following items as furnished by the designated Sections:
 - (1.) None. All items to be installed by this trade, shall be furnished by this trade.
- D. **Items to Be Furnished Only:** Furnish the following items for installation by the designated Sections:
 - (1.) None.
- E. **Related Work Specified Elsewhere:** The following items are not included in this Section, and will be performed under the designated Section:
 - (1.) N/A

1.03 SUBMITTALS

- A. Make submittals under provisions of Section 01.33.00.
- B. **Product Data:** Provide manufacturer's printed information and installation instructions on siding products, underlayments, trim and accessories.
- C. **Samples:** Provide 3 samples of siding and trim products in colors specified, not less than 12 inches in length. Provide a trim sample no less than 8 inches in length.

1.04 QUALITY ASSURANCE

- A. **Installer:** Provide installer with not less than five years of experience with products similar to those specified.
- B. **Installer:** The installer must be authorized by the siding manufacturer and their appropriate association.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Inspect materials upon delivery to assure that specified products have been received.
- B. Store materials in safe area, away from construction traffic; store under cover and off the ground, protected from moisture.
- C. Keep materials clearly separated and identified with grade marks legible. Keep damaged material identified as damaged and stored separately.

1.06 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity and ventilation) within limits recommended by the manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.07 WARRANTY

- A. Cedar siding and trim:
 - (1.) Provide minimum 50 year or manufacturer's warranty. Arrange a training session by the shingle manufacturer's representative, to train the own's staff in the proper maintenance of the siding as required to maintain the warranty.
- B. Installer's Warranty:
 - (1.) 1 year labor and materials on all products installed.

II PART 2 PRODUCTS

2.01 WOOD SIDING / TRIM / SOFFIT

- A. Acceptable Manufacturers:
 - (1.) Maibec Siding Inc, Quebec, G1X 3W3 Canada, 1.800.363.1930, www.maibec.com
 - (2.) Bear Creek Lumber, Washington 1.800.597.7191
 - (3.) Cedarwood Products, Eugene, OR (514) 345-1336 www.cedarwoodproducts.net
 - (4.) Approved equal.
- B. Siding (clapboards):
 - (1.) Type: Western Red Cedar
 - (2.) Grade: A, blue label re-squared and rebuted
 - (3.) Length: 6"
 - (4.) Thickness: 1/2" butt
 - (5.) Width: random, ranging from 4'-0" to 16'-0"
 - (6.) Exposure: to match existing
 - (7.) Texture: smooth face, square bottom
 - (8.) Finish: treated for finish field painting
- C. Trim (1x):
 - (1.) Type: Western Red Cedar
 - (2.) Length: as required
 - (3.) Thickness: 3/4"
 - (4.) Width: as required
 - (5.) Finish: treated for finish field painting
- D. Fasteners
 - (1.) Fasteners shall be No. 316 stainless steel, annular ring shank nails.
 - (2.) Length must penetrate solid wood a minimum of 1 1/4".

2.02 METAL PANNING AND FLASHING

- A. Thickness : 0.024" aluminum break metal, from sheet or coil stock
- B. Finish: Mill where overlapping siding, wood trim or concrete, white where overlapping PVC trim
- C. Fasteners: Aluminum Finish nail.

2.03 WATERPROOFING UNDERLAYMENT (ice and water shield):

- A. Self-healing adhesive bituminous roofing underlayment, smooth faced, as manufactured by one of the following:
 - (1.) GAF "Weather Watch".
 - (2.) WinterGuard; CertainTeed Corporation.
 - (3.) ArmourGard
 - (4.) Or approved equal.

2.04 HOUSEWRAP

- A. Spunbonded polyolefin non-woven, non-perforated, housewrap similar to DuPont "Tyvek HomeWrap", James Hardie "hardie Wrap HZ5", Dow "Weather Mate Plus" Typar "House Wrap" or approved equal ASTM E 1677 Type 1 air retarder, meeting the following:
 - (1.) Flame Spread Rating minimum 25 per ASTM E 84
 - (2.) Smoke Developed minimum 450 per ASTM E 84
 - (3.) Water Vapor Permeance minimum 20 perms per ASTM E96
 - (4.) Allowable UV Exposure Time not less than 3 months
- B. Provide manufacturer's flexible flashing tape for use at all sheet-to-wall or at door or window nailing fins or similar terminations. Minimum width 7".
- C. Characteristics:
 - (1.) Thickness: 11 mil
 - (2.) UV stability of at least 180 days.
 - (3.) Water Holdout: minimum 200cm (AATC 127)
 - (4.) Permeability: between 10-20 perms (ASTM E-96A)
 - (5.) Tear Strength: minimum 15 psi (ASTM D1117)
- D. Accessories:
 - (1.) Fasteners: manufacturer's recommended cap-nail system. Staples or power-driven nails are not permitted.
 - (2.) Tape: straight and flexible butyl rubber based flashing tape with a non-woven or creped cross-laminated polyolefin facing, manufactured by the manufacturer of the air infiltration barrier and specifically engineered for sealing sheet-to-sheet and sheet-to-wall construction joints and overlaps. Minimum width 3".

2.05 SEALANT AND CAULKING

- A. All sealant shall match the adjacent trim in color.
- B. Sealant at siding, exterior trim, new door thresholds and siding penetrations: Tremco - Dymonic FC, Fast Skinning, Low Modulus Polyurethane Sealant or approved equal by Sonnoberne or Sika.
- C. Sealant beds all horizontal flashings: Tremco - Vulkem 45 SSL, one part, semi-self leveling, sealant or approved equal by Sonnoberne or Sika.

III PART 3 EXECUTION

3.01 EXAMINATION

- A. Prior to commencing installation, verify governing dimensions of building and condition of substrate. Correct any defects that would affect the appearance of installation of the siding and trim materials.
- B. Verify that damaged sheathing has been replaced and loose sheathing re-secured.
- C. Verify all fasteners left after demolition have been removed or set flush with the sheathing.
- D. Examine, clean, and repair as necessary any substrate conditions which would be detrimental to proper installation.
- E. Discard boards and shingles that are warped, twisted, bowed, crooked or otherwise defective.
- F. Do not begin installation until unacceptable conditions have been corrected. The start of work signifies acceptance of the existing conditions.

3.02 COORDINATION

- A. Prior to residing, coordinate as required with electrician, to ensure that the existing electrical items scheduled for removal, have been removed and former openings infilled and remaining / new wires are in their final locations.
- B. Coordinate the installation of doors and windows, to permit proper flashing of rough openings.

3.03 WATERPROOFING UNDERLAYMENT (Ice and Water Shield Underlayment)

- A. Apply adhesive backed waterproof underlayment where noted on Drawings, and in the following locations:
 - (1.) As detailed, behind mounting block, penetration, etc.
 - (2.) Install from the bottom of all sheathing at grade level up 18".

3.04 HOUSEWRAP

- A. **INSTALL HOUSEWRAP** over exterior face of exterior wall substrate in accordance with manufacturer recommendations.
 - (1.) Start housewrap installation at a building corner, leaving 6-12 inches of housewrap extended beyond corner to overlap.
 - (2.) Install housewrap in a horizontal manner starting at the lower portion of the wall surface. Maintain housewrap plumb and level.
 - (3.) Subsequent layers shall overlap lower layers a minimum of 6 inches horizontally in a shingling manner.
- B. **HOUSEWRAP ATTACHMENT:**
 - (1.) Attach housewrap to studs through exterior sheathing. Secure using housewrap manufacturer recommended fasteners, spaced 12 -18 inches vertically on center along stud line, and 24 inch on center, maximum horizontally. Use Capped fasteners.
- C. **SEAMING**
 - (1.) Seal seams of housewrap with seam tape at all vertical and horizontal overlapping seams.
 - (2.) Seal any tears or cuts as recommended by housewrap manufacturer.
- D. **OPENING PREPARATION (for use with flanged windows)**
 - (1.) Cut housewrap membrane in a modified "I-cut" pattern.
 - (a.) Cut housewrap horizontally along the bottom of the header.

- (b.) Cut housewrap vertically 2/3 of the way down from top center of window opening.
- (c.) Cut housewrap diagonally from bottom of center vertical cut to the left and right corners of the opening.
- (d.) Fold side and bottom housewrap flaps into window opening and fasten.

- (2.) Cut a head flap at 45-degree angle in the housewrap membrane at window head to expose 8 inches of sheathing. Temporarily secure housewrap membrane flap away from sheathing with tape.

E. FLASHING

- (1.) Cut flexible flashing tape a minimum of 12 inches longer than width of sill rough opening. Apply primer if recommended by the manufacturer.
- (2.) Cover horizontal sill by aligning flexible flashing tape edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.
- (3.) Fan flexible flashing tape at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges.
- (4.) Following installation of window, apply strips of straight flashing tape at jambs overlapping entire window mounting flange. Extend jamb flashing 1-inch above top of rough opening and below bottom edge of sill flashing.
- (5.) Apply strip of straight flashing tape as head flashing overlapping the mounting flange. Head flashing should extend beyond outside edges of both jamb flashings.
- (6.) Position housewrap head flap across head flashing. Adhere using straight flashing tape over the 45-degree seams.
- (7.) Tape head flap in accordance with housewrap manufacturer's recommendations.

3.05 SIDING AND TRIM INSTALLATION

- A. General: Install products in accordance with the latest printed instructions of the manufacturer and applicable building codes, with all components true and plumb.
- B. Finish materials on all sides and ends. Apply touch up coating on new cuts. Touch up all areas with bleaching oil provided by siding manufacturer.
- C. Shingles shall be installed over a starter course of cedar shingles, not starter strips or clapboards. All inside corners shall receive nominal 1" x 1" cedar strips (finished to match siding) to terminate siding against.
- D. Overlap shingles to achieve specified exposure and adjust exposure slightly as required to account for existing out-of-plumb or level conditions of the wall and to align the siding around the building. Exposure shall not be less than 4" nor more than 5" in any location.
- E. Install with bottoms of shingles in uniform alignment. Utilize story poles during layout, to ensure that courses align around corners
- F. All shingles shall be installed with a minimum to two nails per shingles.
- G. Install the siding using a blind nailing method. Shim siding as required to leave an even plane surface and square corners. Leave a 1/8" gap between sides of cedar shingles and where sides of shingles meet PVC trim.
- H. Joints: Stagger butt joints in uniform pattern as successive courses of siding are installed. No joints shall align with in four courses. All joints shall be offset a minimum of 1/2" within 4 courses.
- I. Apply sealant as required by the manufacturer's installation instructions and as shown on drawings.

3.06 METAL PANNING / FLASHING

- A. Fabricate metal flashing per SMACNA standards to fit existing conditions.
- B. All metal panning shall be installed in longest lengths possible, min 10 feet.
- C. Where multiple pieces are required, all joints shall overlap a minimum of 1" and shall overlap in a manner that will not allow water behind the panning. All overlapping areas should be pop-riveted along joint with color matching rivets a minimum of two per joint. The concealed section of metal panning shall have an elongated slot to allow for thermal expansion and contraction. Each overlapping end should also be sealed with sealant.
- D. Install metal flashing at all horizontal boards, window and door heads and mounting blocks. Flashing to extend a minimum 6" up walls and turn down a minimum 1/4" over face of boards.
- E. Install flashing prior to underlayments. Where back leg of flashing must be cut (such as pitched trim over front doors), seal to sheathing with additional waterproof underlayment, prior to installation of standard underlayment.

3.07 SEALANT

- A. Install all sealant in a continuous bead per manufacturer's recommended width.
- B. Tool all visible joints should to a smooth uniform appearance.
- C. Install caulk joints at all locations where dissimilar material meets and as shown on the drawings.

3.08 WIRES AND CABLES

- A. All existing exposed coaxial cable, phone lines and other such wiring shall be consolidated and neatened, then secured to the building.
- B. Run wiring in straight paths, horizontally or vertically, to the greatest extent possible. Diagonal wires shall be lengthened by the service provider responsible for them.
- C. Bundle wires where possible using zip ties. Secure bundles to siding at regular intervals using clips.

3.09 CLEANING

- A. At completion of work, remove all debris and recycle/dispose as specified.
- B. Prior to final acceptance, the Owner and Architect shall reinspect all buildings and the contractor shall apply additional bleaching oil where directed, and deliver all unused bleaching oil to the Owner.
- C. Replace any PVC trim components which are soiled by adhesive or damaged, and cannot be satisfactorily cleaned or repaired.

END OF SECTION
7.46.00

SECTION 08.36.00

OVERHEAD DOORS

I. PART I - GENERAL

1.01 GENERAL

- 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.

1.02 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. Insulated sectional overhead door system.
- B. **Alternates:** N/A
- C. **Items to Be Installed Only:** Not Applicable.
- D. **Items to Be Furnished Only:** Furnish the following items for installation by the designated Sections:
 - 1. None.
- E. **Related Work Specified Elsewhere:** The following items are not included in the Section, and will be performed under the designated Sections:
 - 1. Section 07.21.00 - SIDING AND TRIM - Trim around doors
 - 2. Section 09.90.00 - PAINTING - Field painting of overhead doors.

1.03 SUBMITTALS

- A. 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.
- B. Shop Drawings: Indicate plans and elevations including opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations and installation details.
- C. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- D. Operation and Maintenance Data.
- E. Qualification Data: For Installer.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
- B. Installer Qualifications: Authorized representative of the manufacturer with minimum five years documented experience.

- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. Acceptable to authority having jurisdiction as suitable for purpose specified.
- D. ANSI / DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors.

1.05 DESIGN / PERFORMANCE REQUIREMENTS

- A. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable local code. The manufacturer shall perform calculations to determine all required design pressures and submit with shop drawings.
- B. Single-Source Responsibility: Provide doors, tracks and accessories from one manufacturer for each door type. Provide secondary components from source acceptable to manufacturer of primary components.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Stored products in manufacturer's unopened labeled packaging until ready for installation.
- B. Protect materials from exposure to moisture until ready for installation.
- C. Store materials in a dry, ventilated watertight location.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication, discuss lead time with owner at the project kick-off meeting.
- B. Pre-Installation Conference: Convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

1.08 COORDINATION

- A. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.09 WARRANTY

- A. Warranty: Manufacturer's limited door and operators System warranty for 10 year against delimitation of polyurethane foam from steel face and all other component for 3 years or 20,000 cycles, whichever comes first.
- B. One year warranty on installation.

II. PART II - PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturer: Overhead Door Corp., 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: www.overheaddoor.com E-mail: sales@overheaddoor.com.
- B. Substitutions: Equal Manufacturers / Models with a complete systems submitted with a full comparison sheet will be reviewed / consider for a substitution.

2.02 INSULATED SECTIONAL OVERHEAD DOORS

- A. Insulated Steel Sectional Overhead Doors: 596 Series Thermacore Insulated Steel Doors by Overhead Door Corporation. Units shall have the following characteristics:
 - 1. Door Assembly: Metal/foam/metal sandwich panel construction, with PVC thermal break and weather-tight ship-lap design meeting joints.
 - (a) Panel Thickness: 2 inches (51 mm).
 - (b) Exterior Surface: Flush, textured.
 - (c) Exterior Steel: 20 gauge, galvanized.
 - (d) End Stiles: 16 gauge with thermal break.
 - (e) Spring Counterbalance: Sized to weight of the door, with a helically wound, oil tempered torsion spring mounted on a steel shaft; cable drum of diecast aluminum with high strength galvanized aircraft cable. Sized with a minimum 7 to 1 safety factor.
 - (i) High cycle spring: 100,000 cycles.
 - (f) Insulation: CFC-free and HCFC-free polyurethane, fully encapsulated.
 - (g) Thermal Values: R-value of 17.40; U-value of 0.057.
 - (h) Air Infiltration: 0.08 cfm at 15 mph; 0.08 cfm at 25 mph.
 - (i) Sound Transmission: Class 26.
- B. Finish and Color:
 - 1. Two coat baked-on polyester:
 - (a) Interior color: White
 - (b) Exterior color: White
- C. Wind load Design: Provide to meet the Design / Performance requirements for the site.
- D. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.
- E. Lock:
 - 1. Interior mounted slide lock / twist handle.
 - 2. Locking mechanism designed to maintain security for exterior while permitting break out when impacted from the inside.
 - 3. No exterior key.
- F. Weatherstripping:
 - 1. EPDM bulb-type strip at bottom section.
 - 2. Flexible Jamb seals.
 - 3. Flexible Header seal.
- G. Track: Provide track as recommended by manufacturer to suit loading required and clearances available.
 - 1. Size:
 - (a) 3 inch (76 mm).
 - 2. Type:
 - (a) Standard lift.
- H. Manual Operation: Provide pull rope for closing.

III. PART III - EXECUTION:

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

- D. Proceed with installation only after unsatisfactory conditions have been corrected.

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.

3.03 INSTALLATION

- A. Install overhead doors and track in accordance with approved shop drawings and the manufacturer's printed instructions.
- B. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.
- C. Anchor assembly to wall construction and building framing without distortion or stress.
- D. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- E. Fit and align door assembly including hardware.

3.04 ADJUSTING AND CLEANING

- A. Adjust door assembly to smooth operation and in full contact with weatherstripping.
- B. Clean doors, frames.
- C. Remove temporary labels and visible markings.

3.05 PROTECTION

- A. Do not permit construction traffic through overhead door openings after adjustment and cleaning.
- B. Protect installed products until completion of project.
- C. Touch-up, damaged coatings and finishes and repair minor damage before Substantial Completion.

END OF SECTION
08.36.00

SECTION 08.62.10

STEEL WINDOW RESTORATION

I. PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

- A. The General Conditions, Supplementary General Conditions, and applicable parts of Division I as part of this Section.
- B. This Contractor must be familiar with all other Divisions and Sections which affect this Work.

1.02 DESCRIPTION OF WORK

- A. **Work included:** select repair / restoration of existing steel windows and frames in the building. It includes removal and replacement of existing window glazing. All work will match existing / historic details and materials. The work of this Section, includes but is not limited to the following:
 - 1. Window re-glazing.
 - 2. Perimeter sealant
 - 3. Please note, Steel windows have historically been coated with Lead Based Paint (LBP). The testing, removal and proper disposal of such paint shall be the responsibility of a certified Lead Paint Contractor.
 - 4. All damaged or non-historic type glazing on all elevations shall be replaced with new glass to match historical conditions.
- B. **Alternates:** N/A
- C. **Items to Be Installed Only:** Install the following items as furnished by the designated Sections:
 - 1. None. All items to be installed by this trade, shall be furnished by this trade.
- D. **Items to Be Furnished Only:** Furnish the following items for installation by the designated Sections:
 - 1. None.
- E. **Related Work Specified Elsewhere:** The following items are not included in this Section, and will be performed under the designated Section:
 - 1. 02.08.00 - Asbestos Abatement - Abatement of window putty.
 - 2. 02.08.10 - Disturbance of Lead, Cadmium & Chromium Materials
 - 3. 09.90.00 - Painting - Field painting of windows

1.03 WORK BY OTHERS

- A. Section 01.31.00 - PROJECT MANAGEMENT - Worcester Park Dept to coordinate the removal of items as required to preform the work of this contract.

1.04 REFERENCES

- A. American Architectural Manufacturers Association (AAMA):
 - 1. AAMA 502 - Voluntary Specification for Field Testing of Windows and Sliding Doors.
 - 2. AAMA 613 - Voluntary Performance Requirements and Test Procedures for Organic Coatings on Plastic Profiles.
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM C 1036 - Flat Glass.

2. ASTM C 1048 - Heat-Treated Flat Glass--Kind HS, Kind FT Coated and Uncoated Glass.
3. ASTM D 3656 - Insect Screening and Louver Cloth Woven from Vinyl-Coated Glass Yarns.
4. ASTM E 283 - Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Difference Across the Specimen.
5. ASTM E 547 - Water Penetration of Exterior Windows, Curtain Walls and Doors by Cyclic Static Air Pressure Differential.

C. Screen Manufacturers Association (SMA):

1. SMA 1201 - Specifications for Insect Screens for Windows, Sliding Doors and Swinging Doors.

D. Window and Door Manufacturers Association (WDMA):

1. ANSI/AAMA/NWDA 101/I.S.2 - Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors.

1.05 SUBMITTALS

- A. Submit in accordance with Section 01.33.00.
- B. Product Data: Submit manufacturer's product data, including installation instructions.
- C. Glazing compound
- D. Caulking
- E. Cleaner
- F. Weather stripping
- G. Restoration Plan:
 1. Develop a plan of restoration encompassing all staged of work.
 2. Include at a minimum:
 - (a) Written description of all damage and methods and techniques of repair.
 - (b) Environmental factors affecting work and methods proposed to ensure construction within appropriate environmental conditions.
 - (c) Proposed phasing and timing of the work including coordination with progress of adjacent restoration work.
 - (d) Methods of protection for surrounding construction and exterior vegetated areas of soils.

1.06 QUALITY ASSURANCE

- A. Source Limitations: all types of windows / components to be provided shall be produced by the same manufacturer
- B. The work of this section shall be conducted by a firm with not less than three (3) years of successful experience in window restoration work similar to the historic restoration work indicated.
- C. Mock-up:
 1. Completed restoration of one (1) window to demonstrate aesthetic effects and set quality standards for material and execution. Review completed mock-up for approval by Owner. Correct all conditions noted during the review process. Re-check until approved, at no additional cost to owner.
 2. Do not begin remaining restoration work until mock-up is approved.

1.07 DEFINITION

- A. In-Kind: Replacement material to match original in detail and design in every way: new material to match adjacent existing materials.

1.08 JOB CONDITIONS

- A. Do not proceed with any portion of the Work outlined until unsatisfactory conditions have been corrected in a manner acceptable to the applicator.
- B. Notify Owner about anticipated problems and request direction.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site undamaged in manufacturer's or sales branch's original, unopened containers and packaging, with labels clearly identifying manufacturer and product name. Include installation instructions.
- B. Storage:
 - 1. Store materials in accordance with manufacturer's instructions.
 - 2. Store materials off ground and under cover.
 - 3. Protect materials from weather, direct sunlight, and construction activities.
- C. Handling: Protect materials and finish during handling and installation to prevent damage.

1.10 WARRANTY

- A. Provide installer's warranty under provisions of Section 01.77.00.

II. PART 2 PRODUCTS

2.01 GLASS

- A. Salvage existing intact historic glass for re-installation.
- B. Provide new restoration glass for broken or missing panes as noted on the drawings.
 - 1. For historic glass: match in-kind existing. Based on approval of samples matching existing historic glass condition, provide Hollander Glass "Restover" 3.5mm machine drawn restoration glass or approved equal.

2.02 HARDWARE AND ACCESSORIES

- A. Identify missing or damaged hardware, including but not limited to latches, hinges, hold opens, trims and accessory profiles. Salvage all hardware and accessories for repair, cleaning and reinstallation at original location.
- B. Contractor shall repair all hardware in non-working condition. If hardware cannot be made to operate as original or hardware is missing, contractor shall provide replica hardware to match existing in-kind in every regard. For any hardware replicated provide attic stock (4 pieces of each).

2.03 CHEMICAL CLEANERS

- A. Dumont Chemicals, Inc. Peel Away 1 for removal of lead base paint, or approved equal.

2.04 GLAZING COMPOUND

- A. Use AllPro Corporation Glazing Compound for Metal window frames, or an approved equal.
- B. DAP 1012 Glazing Compound or approved Equal.

2.05 WEATHERSTRIPPING

- A. Three (3) types of weather stripping shall be tested for use in this project:

1. Bronze spring metal with integral friction fit mounting.
 2. Vinyl strip "V" shape with adhesive attachment.
 3. Sealant bead set with bond breaker tape to the operable sash.
- B. Apply weather stripping following final paint operation.
- C. Coordinate final selection and installation of weatherstripping using a test window in the field.

2.06 MISCELLANEOUS MATERIALS

- A. Primers, Sealers and Filling Compound and caulking. Provide materials needed to complete the Work specified.
1. Paint products, both primer and paint finish shall be furnished and installed under Section 09.90.00

2.07 ACCESSORIES

- A. Spray Foam Insulation: low pressure polyurethane expanding foam sealant meeting ASTM C 1620 and passing AAMA 812 for use at doors and windows. Manufacturer must be able to supply an ICC-ES report indicating product complies with 2009 IBC requirements.
- B. Sealant: At painted surfaces: Siliconized acrylic latex caulking, at back of nailing flange.

III. PART 3 EXECUTION

3.01 COORDINATION

- A. Coordinate with Section 02.08.00, Section 02.08.10, Section 02.41.00 to ensure that all required demolition is complete.
- B. Coordinate with 07.46.00 to ensure that barrier have been installed, lapped into openings and taped properly.

3.02 PREPARATION

- A. Contractor is responsible for protection of WPD belongings, flooring and wall finishes as interior work progresses.
- B. The start of installation constitutes the acceptance of existing conditions.

3.03 RESTORATION SEQUENCE

- A. Determine was made that recognizes that the existing windows are in sound conditions. The Restoration work of this project includes, but is not limited to, the following:
1. All existing glazing and glazing putty to be removed under the abatement sections.
 2. Prep and paint window frame (specified under the Section 09.90.00 - Painting)
 3. Install new glazing.
 4. Final sealant.

3.04 INSTALLATION

- A. Install glazing in accordance with industry standards.
- B. Install items to be weather-tight and freely operating.
- C. Maintain alignment with adjacent work.
- D. Secure assembly to framed openings, plumb and square, without distortion.
- E. Caulk backside of window flange prior to installation.

- F. Leave windows closed and locked.

3.05 FIELD QUALITY CONTROL

- A. Field Testing: If the quality of the window construction or installation is questionable, the Owner may, at their discretion, require field testing of windows in place following the procedures of AAMA 502, Test Method A.
 - 1. The Owner will select and arrange for the testing agency.
 - 2. If tested windows pass, the costs of the testing shall be paid for by the Owner.
 - 3. If the tested windows fail, the costs of the testing shall be paid for by the Contractor, the window shall be removed and replaced or repaired, and then retested.

3.06 ADJUSTING AND CLEANING

- A. Adjusting:
 - 1. Perform adjustments immediately after installation, while work is still ongoing in the apartment.
 - 2. Adjust units for smooth operation without binding or racking.
 - 3. Adjust sash locks and screens for smooth operation.
 - 4. Adjust shades to roll up completely.
- B. Remove any labels visible markings after Inspection or when permitted by the Building Inspector.
- C. Clean window frames and glass in accordance with Division 1 requirements.
- D. Do not use harsh cleaning materials or methods that would damage finish or glass.

3.07 PROTECTION

- A. Protect installed windows to ensure that, except for normal weathering, windows will be without damage or deterioration at time of substantial completion.

END OF SECTION
08.62.10

SECTION 09.21.16

GYPSUM BOARD

I PART 1 GENERAL

1.01 GENERAL PROVISIONS

- A. The General Conditions, Supplementary General Conditions, and applicable parts of Division I as part of this Section.
- B. This Contractor must be familiar with all other Divisions and Sections which affect this Work.

1.02 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. Interior wall board.
 - 2. Interior Moisture resistant board.
 - 3. Taped and sanded joint treatment.
 - 4. Access Panels.
 - 5. All required accessories.
- B. **Alternates:** N/A
- C. **Items to Be Installed Only:** Install the following items as furnished by the designated Sections:
 - 1. None.
- D. **Items to Be Furnished Only:** Furnish the following items for installation by the designated Sections:
 - 1. N/A
- E. **Related Work Specified Elsewhere:** The following items are not included in the Section, and will be performed under the designated Section:
 - 1. Section 06.10.00 - ROUGH CARPENTRY for blocking incorporated into framing.
 - 2. Section 09.99.00 - PAINTING for field finishing of wallboard.

1.03 REFERENCES

- A. 780 CMR, Massachusetts State Building Code, Chapter 25
- B. ANSI/ASTM C1396 - Gypsum Wallboard.
- C. ANSI/ASTM C475 - Joint Treatment Materials for Gypsum Wallboard Construction.
- D. GA-216, ASTM C 840 - Recommended Specifications for the Application and Finishing of Gypsum Board.
- E. UL Directory - installation techniques for rated assemblies

1.04 SUBMITTALS

- A. Product Data: submit manufacturer's literature for each product specified, indicating conformance to specifications.

- B. Samples: not required.
- C. Qualification Data: submit evidence of fire resistance for all rated materials specified.

1.05 QUALITY ASSURANCE

- A. Source limitations: obtain all boards, joint compound and accessories from a single manufacturer, to constitute a "system".
- B. Installation shall conform to the requirements of 780 CMR, Massachusetts State Building Code.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install interior products until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

II PART 2 PRODUCTS

2.01 BOARD MATERIALS

- A. Gypsum wallboard shall meet the following criteria (**ceiling**):
 - 1. Wallboard shall be paperless type or mold resistant paper faced type, with a minimum rating of 10.
 - 2. Thickness: 1/2" or as noted on drawings.
 - 3. Panels size 4'-0" x 8'-0" minimum; use maximum permissible length
 - 4. Ends: square cut
 - 5. Edges: tapered
 - 6. Provide standard wallboard at all areas other than noted below.
- B. Paperless Moisture Resistant Wallboard (**walls**):
 - 1. Georgia Pacific "Dens Armor Plus Abuse Resistant Interior Panel" or approved equal meeting or exceeding the following:
 - 2. Water and mold resistant panels, 5/8" thickness; maximum permissible length; ends square cut, tapered edges.
 - 3. Mold resistance score of 10 when tested to ASTM D3273-00.
 - 4. Water absorption less than 5% of weight
 - 5. Non-paper faced. Faces suitable to receive painted finish.
 - 6. Provide paperless wallboard at all bathroom walls, on both sides, where new materials are required.

2.02 ACCESSORIES

- A. All accessories shall meet ASTM C 1047.
- B. Joint Materials: ANSI/ASTM C475; GA 201 and GA 216; reinforcing tape, joint compound, adhesive, water, and fasteners.
- C. Joint Compound: ASTM C 475, drying or setting type (contractor's preference)
- D. Joint Reinforcing: ASTM 474
 - 1. Outside corners shall be metal or metal/paper combination.
 - 2. Inside corners shall be paper tape.
 - 3. Joints where drywall meets other materials shall receive metal "L" trim with tear-away strips.

2.03 ACCESS PANELS

- A. Provided were required by owner on needed to accesses existing utilities.
- B. Finish: Shop coat of primer, field finished by Painter under Section 09.99.00 - PAINTING

III PART 3 EXECUTION

3.01 COORDINATION

- A. Coordinate the location of blocking at all wall mounted items, such as grab bars and toilet room accessories

3.02 INSPECTION

- A. Verify that site conditions are ready to receive work and opening dimensions are as indicated on shop drawings and instructed by the manufacturer.
- B. Verify that all required blocking for wall mounted items has been installed in proper locations.
- C. Beginning of installation means acceptance of conditions.

3.03 GYPSUM BOARD INSTALLATION

- A. Install boards in accordance with GA 216 and ASTM C 840 and manufacturer's instructions.
- B. At penetrations, extend boards as close to the penetrating element as possible, to minimize the annular space to be firestopped by GC.
- C. Erect single layer standard boards in most economical direction, with ends and edges occurring over firm bearing. Install board tight to underside of structure.
- D. Use drywall screws of appropriate size for both layers, no less than 12" o/c in all directions, to metal framing.
- E. Use galvanized fasteners at cement board.
- F. Treat cut edges and holes in moisture resistant board with sealant.
- G. Place control joints consistent with lines of building spaces as indicated or as directed.
- H. Place corner beads at external corners. Use longest practical length. Place edge trim where board abuts dissimilar materials.

- I. Coordinate locations of access panels with concealed utilities to freely access concealed item(s). Coordinate location with other wall mounted items.

3.04 JOINT TREATMENT

- A. Finish drywall installations in accordance with Gypsum Association's GA-214 as follows:
 - 1. Finished spaces, level 4 minimum
 - 2. Closets and utility spaces, level 3 minimum
- B. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes in strict accordance with the manufacturer's instructions.
- C. Use a 3 coat application at all joints, sanded smooth between applications. Feather coats onto adjoining surfaces. Place corner beads at external corners. Place edge trim where gypsum board abuts dissimilar materials.
 - 1. Where double layers of gypsum board are installed, only the outer layer is required to have joint treatment.

3.05 ACCESS PANELS

- A. Install new access panels at all existing valves, drains and equipment as required. Install framing as required securely mount the new access panels.
- B. Coordinate locations and frequency with MEP drawings and contractors.

END OF SECTION
09.21.16

SECTION 09.90.00

PAINTING

I. PART 1 - GENERAL

1.01 GENERAL

- A. General and Supplementary General Conditions, Special Conditions and applicable parts of Division I as part of this Section.
- B. This Contractor must be familiar with all other Divisions and Sections of the Specifications which affect the work of this Section.

1.02 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. Painting of exterior siding and trim.
 - 2. Painting of metal windows and doors, interior / exterior.
 - 3. Painting of new wall / ceiling board / interior trim.
- B. **Alternates:** None.
- C. **Items to Be Installed Only:** Install the following items as furnished by the designated Sections:
 - 1. None. All items to be installed by this trade, shall be furnished by this trade.
- D. **Items to Be Furnished Only:** Furnish the following items for installation by the designated Sections:
 - 1. None.
- E. **Related Work Specified Elsewhere:** The following items are not included in the Section, and will be performed under the designated Section:
 - 1. None.

1.03 SUBMITTALS

- A. Submit product data on all finishing products under provisions of Section 01.33.00.
- B. Product Data: For each paint system indicated. Include block fillers and primers.
 - 1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.

2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
- C. Samples for Verification: Submit one complete fan deck.
- D. Surface Preparation: A detailed description of surface preparation procedures and surrounding area protection plan.

1.04 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptance.
- B. Container labeling to include manufacturer's name, type of paint, brand name, brand code, coverage, surface preparation, drying time, cleanup, color designation, and instructions for mixing and reducing.
- C. Store paint materials at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in well ventilated area, unless required otherwise by manufacturer's instructions.
- D. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 45 degrees F (7 degrees C) for 24 hours before, during, and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.
- B. Do not apply exterior coatings during rain or snow, or when relative humidity is above 50 percent, unless required otherwise by manufacturer's instructions.
- C. Minimum Application Temperatures for Latex Paints: 45 degrees F (7 degrees C) for interiors; 50 degrees (10 degrees C) for exterior; unless required otherwise by manufacturer's instructions.
- D. Minimum Application Temperature for Varnish and Finishes: 65 degrees F (18 degrees C) for interior or exterior, unless required otherwise by manufacturer's instructions.

1.07 DEFINITIONS AND EXTENT

- A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
 1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
 2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
 3. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.

4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.
- B. This Section includes surface preparation and field painting of exposed exterior items and surfaces.
 1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
- C. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Designer will select from standard colors and finishes available
- D. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

1.08 EXTRA MATERIALS

- A. Not required. Deliver any unused paint to Owner.

II. PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. All materials specified in the painting schedule are Sherwin-Williams materials.
- B. Paint by other PPG or Benjamin Moore, meeting or exceeding the performance characteristics listed herein may be substituted at other locations.
- C. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

2.02 MATERIALS

- A. Coatings: Ready mixed, except field catalyzed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating with a good flow and brushing properties; capable of drying or curing free of streaks or sags.
- B. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.
- C. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- D. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
- E. Caulking: DAP "Kwik-Seal Plus" or approved equal siliconized latex caulk with integral anti-microbial additive, white, suitable for painting.

III. PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application.
 - 1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
 - 2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work:
 - 1. Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 - 2. Notify Designer about anticipated problems when using the materials specified over substrates primed by others.

3.02 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
 - 1. Paint colors, surface treatments, and finishes are indicated in the paint schedules.
 - 2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 - 3. Provide finish coats that are compatible with primers used.
 - 4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, grates, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
- B. Surface Preparation:
 - 1. Wood Substrates:
 - (a) Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated
 - (b) Sand surfaces that will be exposed to view, and dust off.
 - (c) Prime edges, ends, faces, undersides, and backsides of wood
 - (d) After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

2. Metal Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.
 - (a) Prime faces.
- C. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.
 1. Prime coat may be omitted where pre-primed trim is installed, however, field priming any cuts is still required.
- D. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
 1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
 2. Omit primer over metal surfaces that have been shop primed and touchup painted.
 3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.
- E. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
 1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
 2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
 3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.
- F. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.
- G. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- H. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.03 PROTECTION

- A. Protect elements surrounding the work of this Section from damage or disfiguration.
- B. Repair damage to other surfaces caused by work of this Section.
- C. Furnish drop cloths, shields, and protective methods to prevent spray or droppings from disfiguring other surfaces. Remove empty paint containers from site.

3.04 APPLICATION COATINGS GENERAL

- A. Apply products in accordance with manufacturer's instructions.
- B. Do not apply finishes to surfaces that are not dry.
- C. Apply each coat to uniform finish.
- D. Sand lightly between coats to achieve required finish.
- E. Allow applied coat to dry before next coat is applied.
- F. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- G. Prime back surfaces of new exterior woodwork with primer paint.

3.05 CLEANING

- A. As Work proceeds, promptly remove paint where spilled, splashed, or spattered.
- B. During progress of Work maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris.
- C. Collect cotton waste, cloths, and material which may constitute a fire hazard, place in closed metal containers and remove daily from site.

3.06 PAINT SCHEDULE: Paint schedule is for new and existing materials. Refer to Item 3.02 B for surface prep of existing materials.

- A. WOOD: Siding, Trim, Shutters, Sashes, Stops, Siding (bare / primed)
 - 1. Latex Systems: Flat- Satin or Gloss Finish (finish sheen picked by Owner / Architect)
 - (a) 1st Coat: S-W Exterior Oil Base Primer, Y24 (4.0 mils wet, 1.4 mils dry).
 - (b) 2nd Coat: S-W Duration Exterior Latex Series.
 - (c) 3rd Coat: S-W Duration, Series (5.3-7.0 mils wet, 3.0 mils dry per coat).
 - (d) Color: to be selected by Owner.
- B. METAL: Misc. Iron, Ornamental Iron, Structural Iron and Steel, Ferrous Metal, Shop Primed Steel and painted steel:
 - 1. Latex Systems: High Gloss Finish
 - (a) Surface preparation: Solvent Clean per SSPC-SP1
 - (b) 1st Coat - S-W Kem Bond Primer, B50 (3.0 - 8.0 mils wet, 1.9-5.0 mils dry).
 - (c) 2nd Coat - S-W Pro Industrial Urethane Enamel, B54 Series.
 - (d) 3rd Coat - S-W Pro Industrial Urethane Enamel, B54 Series (3, 5-7.0 mils wet, 2.0-4.0 mils dry per

- coat).
- (e) Color: to be selected by Owner.

C. WALL BOARD:

1. New and existing gypsum board finish at interiors and where required as touch-up.
 - (a) 1st Coat - S-W - ProMar 200 - Zero VOC Interior Latex Primer or Premium Wall & Wood Interior Latex.
 - (b) 2nd Coat - S-W - Pro Industrial - Urethane Alkyd Enamel or Pro Industrial - Water Based Catalyzed epoxy.
 - (c) 3rd Coat - S-W - Pro Industrial - Urethane Alkyd Enamel or Pro Industrial - Water Based Catalyzed epoxy.
 - (d) Color: to be selected by Owner.

3.07 PAINT COLORS:

- A. As selected by owner.

END OF SECTION
09.90.00

SECTION 26.00.00
ELECTRICAL

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. The 01.00.60 Conditions of the Contract and all sections of Division 1, General Requirements shall be part of this section unless otherwise specifically excluded.

WORK INCLUDED

- B. Work described herein shall be interpreted as work to be done by this contractor. Work to be performed by other trades will be referenced to a particular division of these specifications.
1. This list does not relieve the subcontractor from the responsibility of reviewing each and every drawing of these contract documents to determine if there are further requirements to the sections of work and to determine how work interfaces with other trades and sections of these contract documents.
 2. Work described herein shall be interpreted as work to be done by the Electrical contractor. Work to be performed by other trades will be referenced to a particular contractor or subcontractor.
- C. Provide all labor, materials, tools, and equipment, to complete the installation of the electrical system. Install, equip, adjust, and put into operation the respective portions of the installation specified, and so interconnect various items or sections of work in order to form a complete and operating whole. The work shall consist of, but shall not necessarily be limited to, the following:
1. Lighting systems, including lamps, fixtures, controls, etc.
 2. All raceway systems, including boxes, couplings, and fittings.
 3. All branch circuit wiring systems, including wiring devices, plates, etc.
 4. All testing of equipment installed.
 5. Any other item of work hereinafter specified or indicated on electrical drawings.
 6. Drilling, coring, and cutting of holes (where the largest dimension thereof does not exceed 12 inches) for electrical conduit system, cables and equipment Refer to 01.73.29.
 7. Systems Identification.
 8. Scaffolding, Rigging, and Staging for all Electrical Work, not provided under 01.50.00.
 9. Fire stopping shall be performed by this contractor.
 10. Coordination Drawings.
 11. Spare parts.
 12. Selective Demolition refer to 02.41.00.

1.2 DEFINITIONS

- A. Most terms used within the documents are industry standard. Certain words or phrases shall be understood to have specific meanings as follows:
1. Provide: Furnish and install completely connected up and in operable condition.
 2. Furnish: Purchase and deliver to a specific location within the building or site.
 3. Install: With respect to equipment furnished by others, install means to receive, unpack, move into position, mount and connect, including removal of packaging materials.
 4. Conduit: Raceways of the metallic type which are not flexible. Specific types as specified.
 5. Connect: To wire up, including all branch circuitry, control and disconnection devices so item is complete and ready for operation.

1.3 CONTRACTOR'S REPRESENTATIVE

- A. Retain a competent representative on the project.

1.4 COOPERATION

- A. Work shall be carried on under usual construction conditions, in conjunction with other contractors work. Cooperate with other contractors, coordinate work and proceed in a manner as not to delay progress.
- B. Before proceeding, examine all construction drawings and consult other contractors to coordinate installation and avoid interference.

1.5 CODES, ORDINANCES, AND PERMITS

- A. Codes and Ordinances:
1. All material and work provided shall be in accordance with the following codes and standards as most recently amended.
Commonwealth of Massachusetts Code, 9th Edition
Massachusetts Electric Code, 2017 Edition
State Department of Public Safety
NFPA 101 "Life Safety Code"
NFPA Standards
Standards of the Underwriters Laboratories (UL)
Occupational Safety and Health Act (OSHA)
Americans with Disabilities Act (ADA)
Energy Conservation Code
City of Worcester
 2. Where contract documents indicate more stringent requirements than codes, the contract documents shall take precedence.
- B. Permits:

1. Be responsible for filing documents, payment of fees, and securing of inspection and approvals. Refer to Instructions To Bidders.

1.6 SUBMITTALS

- A. Refer to Section 01.33.00 Submittals for information relative to submission of shop drawings. Electronic submittals are required. No equipment for which review is required shall be installed prior to review, except at Contractor's own risk. Shop Drawings will be required for all electrical equipment.
- B. Notwithstanding any restrictions upon contractor proposed substitutions, should apparatus or materials be permitted by Architect to be substituted for those specified for good cause, and such substitution necessitates changes in or additional connections, piping, supports, or construction, same shall be provided. Assume cost and entire responsibility thereof. Any proposed substitutions shall include the substitution request form as outlined in Section 01.33.00.
- C. Submit the following samples:
 1. Lighting fixtures as may be requested.
 2. Other items as may be requested.

1.7 INSPECTIONS AND TESTS

- A. Inspection: If inspection of materials installed shows defects, such defective work, materials, and/or equipment shall be replaced and inspection and tests repeated.
- B. Tests: Make reasonable tests and prove integrity of work and leave electrical installation in correct adjustment and ready to operate. All panels shall have phases balanced as near as practical. A consistent phase orientation shall be adhered to at all terminations.

1.8 ENERGY REBATE PROGRAM

- A. This project has been designed to incorporate equipment approved for energy rebate such as fixtures, ballasts and lamps. Provide unit prices for each fixture type scheduled. The contractor holding permit for construction shall file all forms required by utility company for energy rebate programs.

1.9 PHASING, DEMOLITION AND MAINTAINING EXISTING SERVICES

- A. During the execution of the work, required relocation, rerouting, etc., of existing equipment and systems in the existing building areas where new work is to be installed or new connections are scheduled to be made, shall be performed by the Electrical Subcontractor, as required by job conditions and as determined by the Architect in the field, to facilitate the installation of the new system, while demolition, relocation work or new tie-ins will be performed. Outages required for construction purposes shall be scheduled for the shortest practical periods of time, in coordination with the Owner's designated representative, for specified, mutually agreeable periods of time, after each of which the interruption shall cease and the service shall be restored. This procedure shall be repeated to suit the Owner's working schedule, as many times as required until all work is completed. Any outages of service shall be approved by the Owner, prior to commencing the work. No outages or shutdowns of service shall occur without the written authorization of the Owner prior to commencing the work. Give notice of any scheduled shutdowns, a minimum of two weeks in advance. Owner shall make their best efforts to meet this request without adversely affecting the electric service to the existing building.

- B. Prior to any deactivation and relocation or demolition work, consult the drawings and arrange a conference with the Architect and the Owner's representative in the field to inspect each of the items to be deactivated, removed or relocated. Care shall be taken to protect all equipment designated to be relocated and reused or to remain in operation and be integrated with the new systems.
- C. Where existing outlets are to be reused and are cut off by the remodeling, they shall be reconnected to existing circuits as required by field conditions. Where existing outlets are to be abandoned, they shall be removed and blank plates installed. Each bidder shall, before submitting his bid, visit the site and make a thorough examination of the conditions in the existing buildings in order to determine the extent of the work to be done.
- D. All deactivation, relocation and temporary tie-ins of electrical systems and equipment shall be provided by the Electrical Subcontractor. All demolition and removal of electrical systems and equipment designated to be demolished shall be provided by the Electrical Subcontractor. Stack all demolished electrical materials except hazardous materials (PCB lighting ballasts, fluorescent lamps, etc.) nearby for removal by the General Contractor. All hazardous electrical materials shall be legally disposed of by the General Contractor. General Contractor will be responsible for removal of the PCB ballasts and lamps from the light fixtures.
- E. The Owner reserves the right to inspect the material scheduled for removal and salvage any items he deems usable as spare parts.
- F. Phasing:
 - 1. The Electrical Subcontractor shall construct the subject in phases as directed by the Architect to suit the project progress schedule, as well as the completion date of the project.
 - 2. For additional information related to phasing, review the General Conditions and Supplementary Conditions and the Architectural drawings.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Product specifications are written in such a manner so as to specify what materials may be used in a particular location or application and therefore do not indicate what is not acceptable or suitable for a particular location or application. As an example: non-metallic sheathed cable is not specified; therefore, it is not acceptable.
- B. For purpose of establishing a standard of quality and not for purpose of limiting competition, the basis of this Specification is upon specified models and types of equipment and materials, as manufactured by specified manufacturers.
- C. In all cases, standard cataloged materials and systems have been selected. Materials such as lighting fixtures specially manufactured for this particular project and not part of a manufacturers' standard product line will not be acceptable. In the case of systems, the system components shall be from a single source regularly engaged in supplying such systems. A proposed system made up of a collection of various manufacturers' products will be unacceptable.
- D. Where Specifications list manufacturers' names and/or "as approved" or "Equal approved by Contracting Officer", other manufacturers' equipment will be considered if equipment meets Specification requirements and has all features of the specified items as are considered essential by Architect.
- E. All material shall be new and shall be UL listed.

2.2 RACEWAYS AND FITTINGS

A. Raceways - General:

1. No raceway shall be used smaller than $\frac{3}{4}$ in. diameter and shall have no more than four 90 deg. bends in any one run, and where necessary, pull boxes shall be provided. Only rigid metal conduit or intermediate metal conduit is allowed for slab work and only where allowed by Architect.
2. Rigid metal conduit conforming to, and installed in accordance with, Article 344 shall be heavy wall zinc coated steel conforming to American Standard Specification C80-1 and may be used for service work, exterior work, slab work, and below grade level slab, wet locations, where raceway may be subject to mechanical damage.
3. Intermediate metal conduit conforming to, and installed in accordance with, Article 342, may be used for all applications where rigid metal conduit is allowed by these specifications.
4. Electrical Metallic Tubing (EMT), conforming to, and installed in accordance with, Article 358 shall be zinc coated steel, conforming to industry standards, may be used in masonry block walls, stud partitions, above furred ceilings, where exposed but not subject to mechanical damage.
5. Surface metal raceways conforming to and installed in accordance with Article 386 shall be used where shown on drawings.
6. Flexible metal conduit shall be used for final connections to recessed lighting fixtures from above ceiling junction boxes and for final flexible connections to motors and other rotating or vibrating equipment. Liquid tight flexible metal conduit shall be used for the above connections which are located in moist locations. All flexible connections shall include an insulated grounding conductor.
7. Rigid non-metallic conduit may be used at the Contractor's option for underground electric and low tension services outside the foundation wall and shall be polyvinyl chloride (PVC) schedule 40, 90 deg. C.
 - a. PVC shall be UL 651A listed and meet NEMA TC2.
8. PVC schedule 40 may also be used for below slab work within building confines and below grade branch circuits outside the building foundation. Raceway and fittings shall be of the same manufacturer. Below slab conduits do not require concrete encasement. Rigid non metallic conduit shall not be used in-slabs.
9. Acceptable manufacturers:
 - a. Pittsburgh Standard Conduit Company
 - b. Republic Steel and Tube
 - c. Youngstown Sheet and Tube Company
 - d. Carlon
 - e. Or equal
10. PVC coated, threaded conduit shall be used in corrosive environments where called out for on drawings.
 - a. Manufacturers: Permacote or equal
 - b. Provide Permacote fittings and outlet boxes at these locations.
11. Fittings:
 - a. Provide insulated bushings on all raceways 1 inch diameter or larger.

- b. Manufacturer's standard fittings shall be used for raceway supports.
- c. Expansion Fittings: Expansion fittings shall be used where structural and concrete expansion joints occur and shall include a ground strap.
- d. Couplings for rigid metal and intermediate metal conduit shall be threaded type.
- e. Threadless fittings for EMT shall be set screw type. All fittings shall be concrete tight. No diecast fittings allowed except for raceways larger than 1 inch diameter.
- f. All entrance seals shall be equal to O.Z. Gedney type "WSK".
- g. Couplings, elbows and other fittings used with rigid nonmetallic conduit shall be of the solvent cemented type to secure a waterproof installation.
- h. Acceptable manufacturers:
 - 1) O.Z.
 - 2) Crouse Hinds
 - 3) Appleton
 - 4) EFCOR
 - 5) Steel City
 - 6) Or equal

B. Outlets, Pull and Junction Boxes:

1. Outlets:

- a. Each outlet in wiring or raceway systems shall be provided with an outlet box to suit conditions encountered. Boxes installed in normally wet locations or surface mounted shall be of the cast-metal type having hubs. Concealed boxes shall be cadmium plated or zinc coated sheet metal type. Old work boxes with Madison clamps not allowed in new construction. Thru the wall boxes are not permitted.
- b. Each box shall have sufficient volume to accommodate number of conductors in accordance with requirements of Code. Boxes shall not be less than 1-1/2 in. deep unless shallower boxes are required by structural conditions and are specifically approved by Architect. Ceiling and bracket outlet boxes shall not be less than 4 in. octagonal except that smaller boxes may be used where required by particular fixture to be installed. Flush or recessed fixtures shall be provided with separate junction boxes when required by fixture terminal temperature requirements. Switch and receptacle boxes shall be 4 in. square or of comparable volume.
- c. Far side box supports shall be Caddy J-1A.
- d. Acceptable manufacturers:
 - 1) Appleton
 - 2) Crouse Hinds
 - 3) Steel City
 - 4) RACO
 - 5) Or equal

2. Pull and Junction Boxes: Where indicated on plans, and where necessary to terminate, tap off, or redirect multiple raceway runs or to facilitate conductor installation, furnish, and install appropriately designed boxes. Boxes shall be fabricated from code gauge steel assembled with corrosion resistant machine screws. Box size shall be as required by Code.

Boxes in moist or wet areas shall be galvanized type. Boxes larger than 4-11/16 inches square shall have hinged covers. Boxes larger than 12 inches in one dimension will be allowed to have screw fastened covers, if a hinged cover would not be capable of being opened a full 90 degrees due to installation location.

a. Acceptable Manufacturers:

- 1) Brasch
- 2) Hoffman
- 3) Keystone
- 4) Lee Products Co.
- 5) McKinstry Inc.
- 6) Eldon Inc.
- 7) Or equal

2.3 CONDUCTORS

- A. All conductors shall be a minimum size of #12 AWG except for control wiring and fire alarm wiring where #14 AWG may be used. For all exit sign circuits, normal/emergency circuits, exterior lighting circuits, and also where distance from panelboard to first outlet exceeds 100 ft. @ 120 volts, #10 AWG shall be minimum size wire allowed. All feeder and branch circuit conductors shall be color coded as follows:

1.	208Y/120V	Phase A	Black
2.	208Y/120V	Phase B	Red
3.	208Y/120V	Phase C	Blue
4.	480Y/277V	Phase A	Brown
5.	480Y/277V	Phase B	Orange
6.	480Y/277V	Phase C	Yellow
7.	Grounded Conductor		
		120/208	White
		277/480	Grey
8.	Equipment Ground		
		120/208	Green
		277/480	Green with Yellow Trace
9.	Isolated Ground	120/208	Green with Orange Trace

- B. All conductors not installed in accordance with color scheme shall be replaced. All conductors larger than #6 AWG must be identified with colored tape.

- C. Connections throughout the entire job shall be made with solderless type devices.

1. For #10 AWG and smaller: spring type.
2. For #8 AWG and larger: circumferential compression type.
3. Acceptable manufacturers:
 - a. 3M "Scotchlock"
 - b. IDEAL "Wingnut"
 - c. BURNDY

- d. MAC
 - e. Or equal
- 4. Any splices made up in ground mounted pull boxes shall be resin cast waterproof type or waterproof pressure type.
- D. Conductors shall be copper, soft drawn, and annealed of 98 percent conductivity. Conductors larger than #10 AWG shall be stranded; #10 AWG and smaller shall be solid. Conductors shall be insulated for 600 volts and be of following types:
 - 1. All conductors shall have heat/moisture resistant thermoplastic insulation type THHN/THWN (75°C) except as follows:
 - a. In sizes #1 AWG and larger: Crosslinked polyethylene insulation type XHHW (75 deg. C – 90 deg. C) may be used.
 - b. Fire alarm system conductors shall be #14 AWG, type THHN, solid. Color coding of fire alarm conductors shall be in accordance with fire codes.
 - c. Fixture whips #16AWG type "SF".
- E. Stranded conductors for all wiring systems except fire alarm will be allowed if installed and terminated as specified under Execution Section.
- F. Type MC cable may be used for concealed branch circuits in hollow spaces where allowed by code if installed and terminated as specified under Execution Section. Armor to be galvanized steel and shall be UL Listed for 2-hour fire wall penetration. Lightweight steel armor is acceptable. Aluminum armor is not acceptable.
- G. Acceptable manufacturers:
 - 1. AFC Cable Systems
 - 2. Cerro
 - 3. Cornish
 - 4. Crescent
 - 5. General Cable
 - 6. Okonite
 - 7. Or equal

2.4 ACCESS PANELS

- A. Furnish access panels for installation by General Contractor for access to concealed junction boxes and to other concealed parts of system that require accessibility for operation and maintenance. In general, electrical work shall be laid out so access panels are not required.
- B. Access panels shall be located in a workmanlike manner in closets, storage rooms, and/or other non-public areas, positioned so that junction can be easily reached and size shall be sufficient for purpose (minimum size 12" x 12"). When access panels are required in corridors, lobbies, or other habitable areas, they shall be located as directed.
- C. Access panels shall be prime painted and equipped with screwdriver operated cam locks.
- D. Acceptable manufacturers:
 - 1. Inland Steel Products Company - Milcor
 - 2. Miami Carey
 - 3. Walsh-Hannon-Gladwin, Inc. - Way Locator
 - 4. Or equal
 - 5. Specific types:
 - a. Acoustical Tile Ceiling "Milcor Type AT"

- | | |
|-------------------------|------------------|
| b. Plastered Surfaces | "Milcor Type K" |
| c. Masonry Construction | "Milcor Type M" |
| d. Drywall Construction | "Milcor Type DW" |
- E. Furnish access panel shop drawings.

2.5 SLEEVES, INSERTS, AND OPENINGS

- A. Sleeves: Provide sleeves of proper sizes for all openings required in concrete floors and walls. Sleeves passing through floors shall be set with top of sleeve 1 in. above finished floor. Core drilling will also be acceptable if in accordance with any structural standards. Any unsleeved openings shall be waterproofed.
- B. Inserts: Provide inserts or other anchoring devices in concrete and masonry construction as required to support raceways and equipment.
- C. Openings: Where an opening is required in concrete slabs to allow passage of a multitude of raceways, give adequate notice to General Contractor so he may box out opening in form work.
- D. Sleeves or openings through slabs for passage of future cables shall be located within 6 inches of walls and shall be in a single row and shall be proofed whether used or not.
- E. Any openings through fire rated surfaces shall be closed off with fireproofing materials providing the same rating as the surface penetrated.
1. Acceptable Manufacturers:
 - a. Specified Technologies Inc.
 - b. Thomas & Betts
 - c. International Protective Coatings Corp.
 - d. 3M Fire Protection Products
 - e. Dow Corning
 - f. Or equal

2.6 WIRING DEVICES

- A. Receptacles: Receptacles shall be flush mounted. All standard 20 ampere devices to be of same manufacturer. Provide corrosive resistant outlets type CR where indicated on the drawings.
1. Acceptable Manufacturers:
 - a. Twenty (20) ampere duplex grounding type NEMA 5-20R,
 - 1) Cooper 5362-V,
 - 2) Hubbell 5362I,
 - 3) Pass and Seymour 53621,
 - 4) Leviton 5362-I
 - 5) Or equal
- B. Switches: 20 ampere,
1. Cooper CWD 2221,
 2. Hubbell 1221,
 3. Pass and Seymour 20AC-2,
 4. Leviton 1221.
 5. Or equal
 6. Prewired devices with pigtails acceptable

- C. Composition material of wiring devices to be nylon with black finish. Confirm with Architect and match existing devices. Corrosive resistant devices shall be yellow.
- D. Coverplates brushed US 302 stainless steel:
 - 1. Provide gaskets on all wiring device plates where devices are on walls separating conditioned and non-conditioned spaces including exterior walls.

2.7 LIGHTING FIXTURES

A. General

- 1. Submit the following in accordance with project submittal procedures:
 - a. Catalog Data: Submit catalog data describing luminaires, lamps, and ballasts. Include data substantiating that materials comply with specified requirements. Arrange data for luminaires in the order of fixture designation.
 - b. Performance Curves/Data:
 - 1. Submit certified photometric data for each type of luminaire.
 - 2. Submit supply-air, return-air, heat-removal, and sound performance data for air handling luminaires.
 - c. Drawings: Submit shop drawings for non-standard luminaires.
 - d. Calculations: Submit as requested to support equal product proposals.
 - e. Warranty: Submit warranties for luminaires and for electronic ballasts.
- 2. All lamps, ballasts, led sources, drivers, and controls shall meet the latest utility company incentive requirements. Refer to the latest program requirements documentation and coordinate with the utility company to ensure compliance.

B. Quality Assurance

- 1. Comply with the National Electrical Code (NEC) and the State Building Code (MBC) for components and installation.
- 2. Provide luminaires listed and labeled by a nationally recognized testing laboratory (NRTL) for the application, installation condition, and the environments in which installed.
- 3. Use manufacturers that are experienced in manufacturing luminaires, lamps and ballasts similar to those indicated for this Project and have a record of successful in-service performance.
- 4. Coordinate luminaires, mounting hardware and trim with the ceiling system.

C. LED Assemblies

- 1. Surface mount fixtures at GWB ceiling:
 - a. Manufacturer: Lithonia Lighting or approved equal meeting the following:
 - b. Lithonia Part Number: FMLWL 48 840
 - c. CRI: 85
 - d. Lumens: 2380
 - e. Type: LED Wraparound / Surface Mount
 - f. Size: 4'-0" Long by 2 3/5" tall
 - g. Voltage: 120V

- h. Wattage: 40
- i. Lamps Included: Yes
- j. Dimmable: No
- k. Color Temperature: 4000
- l. Color Finish: White
- m. Average Life Hours: 50000
- n. Weight: 5
- o. Construction: Metal
- p. Warranty: 5 years

2. Fixtures at acoustic ceiling tile:

- a. Type: Recessed Troffer Light / Drop-in
- b. Size: 2' x 2'
- c. Housing / Frame Color: White
- d. Color Temperature: 4000K
- e. LED Color: Natural 4000K
- f. Comparable wattage: 3 17W Fluorescent T8
- g. Beam Angle: 120 Degree
- h. IP Rating: Non-Waterproof IP40
- i. LED Lifetime: 50000 hours
- j. LED Type: 2835 SMD
- k. Intensity: 4000 Lumens
- l. Connector Type: Pigtail
- m. Standards and Certifications: DLC, LM-80, UL Listed
- n. Total Power Consumption: 35 Watts
- o. Operating Voltage Range: 120-277 VAC
- p. Dimmable: Yes / Type: 0-10-Volt
- q. Efficiency: 117 lm/w
- r. Warranty: 5-Year

- 3. LED luminaires shall conform to UL 1598 and to UL 8250 – Safety Standard for Light-Emitting Diode (LED) Light Sources for Use in Lighting Products.
- 4. Products shall be lead and mercury free.
- 5. Photometric characteristics shall be established using IESNA LM-79-08, IESNA Approved Method for the Electrical and Photometric Measurement of Solid-State Lighting Products.
- 6. Color characteristics of LED luminaires shall be as follows in accordance with ANSI C78.377 – Specifications for the Chromaticity of Solid State Lighting Products.

7. LED and driver cooling system shall be passive and shall resist the buildup of debris.
 8. LED luminaire output after 50,000 hours of operation shall be not less than 70 percent of the initial lumen output when determined in accordance with IESNA LM-80-08 – IESNA approved Method for Measuring Lumen Maintenance of LED Lighting Sources.
 9. LED source package electrical characteristics:
 - a. Supply voltage: 120 V, 208 V, 240 V, 277 V, or 480 V as indicated on the Drawings. Provide step-down transformers if required to match driver input voltage rating.
 - b. Total harmonic distortion (current): Not more than 10 percent.
 - c. Power factor: Not less than 90 percent.
 - d. RF interference: Meet FCC 47 CFR Part 15/18.
 - e. Transient protection: IEEE C62.41 Class A.
- D. Extra Materials
1. Furnish the following extra materials matching products installed. Package with protective covering for storage and identify with labels describing contents.
 - a. (2) Additional surface mount fixtures.
 - b. (1) Additional ACT fixtures.
- E. Interior General:
1. Furnish interior luminaries that comply with requirements specified below, indicated on the Drawings, and as required to meet conditions of installation.
 2. Metal parts shall be free from burrs and sharp corners and edges.
 3. Metal components shall be formed and supported to prevent sagging and warping.
 4. Steel parts shall be finished with manufacturer's standard finish applied over a corrosion-resistant primer. Finish shall be free from runs, streaks, stains, holidays or defects.
 5. Luminaires shall have minimum reflecting surface reflectance as follows unless specified otherwise on the Drawings:
 - a. White Surfaces: 85 percent
 - b. Specular Surfaces: 83 percent
 - c. Diffusing Specular Surfaces: 75 percent
 6. Lenses, diffusers, covers and globes shall be 100 percent virgin acrylic unless specified otherwise on the Drawings. Lenses shall have 0.125 inches minimum thickness. Lenses for fluorescent troffers shall be injection molded.
 7. Luminaires shall conform to UL 1598 - Luminaires. Provide product with damp location listing or wet location listing as required by installation location.

F. Interior Accessories

1. Provide stud supports, mounting brackets, frames, plaster rings and other accessories required for luminaire installation.
2. Furnish hangers as specified below and as required by conditions of installation:
 - a. Stem hangers shall be made of 1/2-inch steel tubing with 45 degrees swivel ball hanger fitting and ceiling canopy. Finish the same as the luminaire.
 - b. Rod hangers shall be made of 1/4 inch threaded zinc-plated steel rod.
 - c. For HID luminaires provide hook hangers that are integrated assemblies matched to the luminaire and line voltage; equip with threaded attachment, power cord and locking type plug. Provide a safety chain or cable for each luminaire that will attach to the building structure, the ballast housing, and to the reflector/diffuser assembly.
3. Use NRTL-listed T-bar safety clips for lay-in luminaires.

G. Interior Installation

1. Install interior lighting system in accordance with the NEC, manufacturer's installation instructions, approved shop drawings, and NECA National Electrical Installation Standards.
2. Have the manufacturer's installation instructions available at the Project site.
3. Mounting heights specified or indicated on the Drawings are to the bottom of the luminaire for ceiling-mounted fixtures and to the center of the luminaire for wall-mounted fixtures.
4. Where the ceiling forms the protective membrane of a fire resistive assembly, install protective coverings over luminaires in accordance with NRTL requirements.
5. Install slack safety wires as described below for luminaires in or on suspended ceilings.
 - a. Wire shall be minimum 12 gage galvanized soft annealed steel wire conforming to ASTM A641.
 - b. Attach wire to the building structure directly above the attachment point on the box or luminaire; make trapezes of framing channel material as required to span obstacles
 - c. Secure wire(s) at each end with not less than three tight turns in 1-1/2 inches.

H. Interior Quality Control

1. Make electrical connections, clean interiors and exteriors of luminaires, install lamps, energize and test luminaires, inspect interior lighting system, and deliver spare parts in accordance with manufacturer's instructions and NECA National Electrical Installation Standards:
2. Test electronic dimming ballasts for full range dimming capability.
 - a. Burn-in dimmer controlled fluorescent lamps at full output for not less than 100 hours before dimming.

- b. Check for visually detectable flicker over the full dimming range.
- 3. Prior to turnover to Owner, replace lamps that were installed and used during construction if more than 15 percent of their rated lamp life has been used.

2.8 GROUNDING SYSTEM

- A. The grounded conductor shall be supplemented by an equipment grounding system.
- B. The equipment grounding system shall be installed so all conductive items in close proximity to electrical circuits operate continuously at ground potential and provide a low impedance path for ground fault currents.
- C. Grounding conductors shall be so installed as to permit shortest and most direct path to ground.
- D. Equipment grounding conductors and straps shall be sized in compliance with Code Table 250-122.
- E. Grounding conductors shall be insulated with green color. Grounding conductors for use on isolated ground receptacles shall be green with trace color to differentiate between normal ground conductors.
- F. Branch circuits shall consist of phase and grounded conductor installed in common metallic raceway. The raceway system may not serve as the grounding conductor. All circuits shall have a separate insulated grounding conductor installed. Any flexible cable system or non-metallic raceway system shall have an insulated grounding conductor. Any cable system for use on isolated ground circuits shall have both an isolated ground conductor as well as an equipment ground conductor, both of which shall be insulated.
- G. Each electrical expansion fitting shall be furnished with a bonding jumper. Provide grounding bushings and ground connections for all raceways terminating below equipment where there is no metal-to-metal continuity.
- H. Continuity between all metallic and non-metallic raceway systems and equipment shall be maintained.

PART 3 - EXECUTION

3.1 WORK COORDINATION AND JOB OPERATIONS

- A. Equipment shall not be installed in congested and possible problem areas without first coordinating installation of same with other trades. Relocate electrical equipment installed in congested or problem areas should it interfere with the proper installation of equipment to be installed by other trades.
- B. Particular attention shall be directed to coordination of lighting fixtures and other electrically operated equipment requiring access which is to be installed in ceiling areas. Coordinate with other trades, the elevations of equipment in hung ceiling areas to insure adequate space for installation of recessed fixtures before said equipment is installed. Conflicts in mounting heights and clearances above hung ceilings for installation of recessed lighting fixtures or other electrically operated equipment requiring access shall be brought to the attention of Architect/Engineer for a decision prior to equipment installation.

- C. Furnish to contractors information relative to portions of electrical installation that will affect other trades sufficiently in advance so that they may plan their work and installation.
- D. Obtain from other trades information relative to electrical work which he, this contractor, is to execute in conjunction with installation of other trades' equipment.
- E. Provide coordination drawings as specified in Division 1 – General Requirements.

3.2 PLANS AND SPECIFICATIONS

- A. Plans:
 - 1. Drawings showing layout of electrical systems indicate approximate location of raceways, outlets and apparatus. Runs of feeders and branch circuits are schematic and are not intended to show exact routing. Final determination as to routing shall be governed by structural conditions and other obstructions.
- B. Specifications:
 - 1. Specifications supplement drawings and provide specifics pertaining to methods and material to be used.

3.3 IDENTIFICATION

- A. Equipment shall be marked for ease of identification as follows.
 - 1. Provide screw-on nameplates on switchboards, panelboards, fire alarm terminal cabinets, starters, and disconnect switches. Nameplates to be of black phenolic with white engraving. For starters and disconnect switches lettering shall be a minimum of ¼ in. high. Nameplates on panelboards shall have the following information.
 - a. Line 1 - Panel designation in ½ in. high letters.
 - b. Line 2 - Utilization voltage in 3/8 in. high letters.
 - c. Line 3 - Distribution source "Fed from " in ¼ in. high letters.
 - 2. Neatly typed directory cards listing circuit designations shall be fastened inside the cover of panelboards. Spare circuits shall be penciled.
 - 3. Color coding schedules. If there is more than a single system voltage, different voltages shall have secondary switchboard and distribution panel and shall be of the phenolic nameplate type as previously specified. A typewritten color code schedule shall also be affixed, under plastic, inside each panelboard door.
 - 4. Outlet boxes both concealed and exposed shall be identified as to panel origination and circuit number by means of fibre pen on the inside of cover plate.
 - 5. Special system outlet boxes concealed above hung ceilings shall be identified as to system by spray painting during roughing. The following systems shall be identified.
 - a. Fire Alarm - red.
 - b. Emergency - yellow.
 - 6. All conductors in boxes larger than standard outlet boxes, in all wireways, trench headers, etc. shall be grouped logically and be identified.
 - 7. Grounding conductors and neutrals shall be labeled in panels, wireways, etc. as to circuits associated with.

3.4 PROTECTION AND CLEANUP

A. Protection:

1. Materials and equipment shall be suitably stored and protected from weather.
2. During progress of work, pipe and equipment openings shall be temporarily closed so as to prevent obstruction and damage.
3. Be responsible for maintenance and protection of material and equipment until final acceptance.

B. Cleanup:

1. Keep job site free from accumulation of waste material and rubbish. Remove all rubbish, construction equipment, and surplus materials from site and leave premises in a clean condition.
2. At completion, equipment with factory finished surfaces shall be cleaned and damaged spots touched up with the same type paint applied at factory.
3. Particular attention is called to Section 110-12(c) of the NEC, which requires that internal parts of electrical equipment not be contaminated by construction operations.

3.5 PORTABLE OR DETACHABLE PARTS

- A. Retain possession of and be responsible for spare parts, portable and detachable parts, and other removable portions of installation including fuses, keys, locks, blocking clips, inserts, lamps, instructions, drawings, and other devices or materials that are relative to and necessary for proper operation and maintenance of the system until final acceptance, at which time such parts shall be installed or turned over to the Owner, as the case may be.

3.6 SAFETY PRECAUTIONS

- A. Provide proper guards, signage, and other necessary construction required for prevention of accidents and to insure safety of life and property. Remove any temporary safety precautions at completion.

3.7 MOUNTING HEIGHTS

- A. All electrical equipment shall be mounted at the following heights unless noted or detailed otherwise on drawings. Notes on Architectural drawings shall supersede those noted below or detailed on the electrical drawings. If mounting height of an electrical component is questionable, obtain clarification from Architect before installation.

1. Duplex convenience outlets - 18 inches.
2. Equipment located in lobbies shall be located as detailed on Architectural drawings or as directed by Architect/Engineer.
3. All receptacles, light switches and fire alarm signals sharing a common location shall be symmetrically arranged.

- B. Mounting heights given are from finished floor to centerline. In the case of a raised floor, surface of raised floor is the finished floor. Electrical Contractor is responsible for reviewing the Architectural Drawings and coordinating all mounting heights within elevations shown on the Architectural Drawings.

3.8 WORKMANSHIP AND INSTALLATION METHODS

- A. Work shall be installed in first-class manner consistent with best current trade practices. Equipment shall be securely installed plumb and/or level. Flush-mounted outlet boxes shall have front edge flush with finished wall surface. No electrical equipment shall be supported by work of other trades. Cable systems shall be supported and not draped over ducts and piping or laid on ceiling suspension members. Lighting fixtures shall be installed to agree with Architects reflected ceiling plans.
- B. Supports:
1. Support work in accordance with best industry practice and by use of standard fittings.
 2. In general, walls and partitions will not be suitable for supporting weight of panelboards, dry type transformers and the like. Provide supporting frames or racks extending from floor slab to structure above.
 3. Provide supporting frames or racks for equipment, intended for vertical surface mounting in free-standing position where no walls exist.
 4. Supporting frames or racks shall be of standard angle, standard channel or specialty support system steel members, rigidly bolted or welded together and adequately braced to form a substantial structure. Racks shall be of ample size to assure a workmanlike arrangement of equipment.
 5. Provide $\frac{3}{4}$ in. thick painted plywood mounting surfaces in all electric and telephone areas and for all equipment on freestanding racks. All plywood shall be fire retardant and painted both sides and edges with two coats of white paint.
 6. No work for exposed installations in damp locations shall be mounted directly on any building surface. In such locations, flat bar members or spacers shall be used to create a minimum of $\frac{1}{4}$ in. air space between building surfaces and work.
 7. Nothing (including outlet, pull and junction boxes and fittings) shall depend on electric raceways or cables for support. All outlet, pull, and junction boxes shall be independently supported.
 8. Nothing shall rest on, or depend for support on, suspended ceiling or its mounting members.
 9. Support surface or pendant mounted lighting fixtures:
 - a. From outlet box by means of an interposed metal strap, where weight is less than five pounds.
 - b. From outlet box by means of a hickey or other direct threaded connection, where weight is from five to fifty pounds.
 - c. Directly from structural slab, deck or framing member, where weight exceeds fifty pounds.
 - d. Pendant lighting fixtures shall be supported by threaded rods in non-public areas and by manufacturer's standard tube hangers with swivel aligner and canopy in public areas. Provide non-standard pendant lengths where required to mount fixtures at elevations either called for on drawings or as shown in Architectural elevations.
 10. Support recessed lighting fixtures directly from structural slabs, decks or framing members, by means of jack chain or air craft cable, one at each end of fixture at opposite corners.

11. Where support members must of necessity penetrate air ducts, provide airtight sealing provisions which allow for a relative movement between the support members and the duct walls.
12. Provide channel sills or skids for leveling and support of all floor mounted electrical equipment.
13. Where permitted loading is exceeded by direct application of electrical equipment to a slab or deck, provide proper dunnage as required to distribute the weight in a safe manner.
14. Support metallic raceways by either running within steel frame or hung from the building frame. Anything hung from building frame shall be attached with metallic fasteners.

C. Fastenings:

1. Fasten electric work to building structure in accordance with the best industry practice.
2. Where weight applied to attachment points is 100 pounds or less, fasten to building elements of:
 - a. Wood -- with wood screws.
 - b. Concrete and solid masonry -- with bolts and expansion shields.
 - c. Hollow construction -- with toggle bolts.
 - d. Solid metal -- with machine screws in tapped holes or with welded studs.
3. Where weight applied to attachment points exceeds 100 pounds, fasten as follows:
 - a. At field poured concrete slabs, provide inserts with 18 in. minimum length slip-through steel rods, set transverse to reinforcing steel.
 - b. Where building is steel framed, utilize suitable auxiliary channel or angle iron bridging between structural steel elements to establish fastening points. Bridging members shall be suitably welded or clamped to building steel. Provide threaded rods or bolts to attach to bridging members.
4. Floor mounted equipment shall not be held in place solely by its own dead weight. Provide floor anchor fastenings. Floor mounted equipment over 72 inches in height shall also be braced to nearest wall or overhead structural elements.
5. For items which are shown as being mounted at locations where fastenings to the building construction element above is not possible, provide suitable auxiliary channel or angle iron bridging to building structural elements.
6. Fastenings for metallic raceways using the fastening as support shall be of the metallic type. Fastenings to hold raceways or cables in place may be via tyrraps.

D. General Raceway Installation:

1. Install the various types of raceways in permitted locations as previously specified. All raceways shall be run concealed. Consult Architect for instruction for raceways which must be exposed in public spaces.
2. Raceways for normal-emergency or emergency only wiring cannot contain other conductors.
3. Raceways shall be properly aligned, grouped, and supported in accordance with code. Exposed raceways shall be installed at right angles to or parallel with

structural members. Concealed raceways may take most direct route between outlets.

4. Raceways run on trapeze hangers shall be secured to the trapeze.
5. Raceways shall be continuous and shall enter and be secured to all boxes in such a manner that each system shall be electrically continuous from service to all outlets. Provide grounding bushings and bonding jumpers where raceways attach to painted enclosures or terminate below equipment.
6. Where raceways enter boxes, cabinets, tap boxes, other than those having threaded hubs, a standard locknut shall be used on the outside and locknut and bushing on the inside.
7. Where raceways terminate below equipment and there is no direct metal to metal continuity, provide grounding bushings on raceways and interconnect with equipment grounding conductor.
8. All empty raceways shall be provided with a pull wire.
9. All raceway sleeves, stub-ups, or stub-outs, where not connected to a box or cabinet, shall be terminated with a bushing.
10. All raceway joints shall be made up tight and no running threads will be permitted.
11. Where raceways are cut, the inside edge shall be reamed smooth to prevent injury to conductors.
12. All vertical raceways passing through floor slabs shall be supported.
13. Raceways shall not be installed in concrete slabs above grade or below waterproofed slabs.
14. Electric raceways and/or sleeves passing through floors or walls shall be of such size and in such location as not to impair strength of construction. Where raceways alter structural strength or the installation is questionable, the structural engineer shall be contacted for approval.
15. Raceways shall not run directly above or below heat producing apparatus such as boilers, nor shall raceways run parallel within 6 inches of heated pipes. Raceways crossing heated pipes shall maintain at least a 1-inch space from them.
16. Raceways shall be installed in such a manner as to prevent collection of trapped condensates, and all runs shall be arranged to drain.
17. Where two alternate wiring methods interconnect such as EMT to flexible metal conduit, an outlet box shall be provided.
18. All empty raceways entering building and all sleeves or core drilled openings through floors shall be sealed.

E. General Outlet Box Installation:

1. Boxes shall be set flush with finish surface and provided with proper type extension rings or plaster covers. Thru the wall boxes are not permitted. Check device or fixture to be mounted to box to ensure box orientation is proper.
2. In addition to boxes shown, install additional boxes where needed to prevent damage to cables and wires during pulling-in operation.
3. Remove knockouts only as required and plug unused openings.

4. Where required for horizontal and vertical alignment of boxes in stud partitions, bar hangers spanning two studs shall be used. Device boxes for insertion type receptacles shall be provided with far side box supports where there are less than two entering nonflexible raceways, and where bar rangers are not provided.
5. Boxes flush mounted in fire rated partitions and on opposite sides of the partition shall be separated by a distance of 24 inches in accordance with UL listing for the box.
6. Locations of outlets indicated on drawings are approximate. For items exposed to view, refer to Architectural drawings and coordinate locations with masonry joints, panel joints, ceiling grids, structural members, etc.
7. In case of conflict with standard mounting heights and device alignment, consult Architect/Engineer prior to roughing.
8. Check all door swings on Architect/Engineer drawings to ensure lighting switches are installed on strike side of door.
9. The right to make any reasonable change in location of outlets prior to roughing is reserved by Architect/Engineer. "Reasonable change" shall be interpreted as movement within 10 feet of location shown.
10. Outlet boxes for use where surface metal raceways are allowed shall be of a type specifically designed to be used with such surface metal raceway systems.

F. Conductor Installation:

1. No conductors shall be pulled into individual raceways until such raceway system is complete and free of debris. No harmful lubricants shall be used to ease pulling.
2. All conductors shall be wired so that grounded conductor is unbroken; switches in all cases being connected in ungrounded conductor.
3. Connections throughout the entire job shall be made with solderless type devices of approved design satisfactory to Inspector of Wires.
4. All taps and splices shall be insulated equal to that of conductor insulation.
5. All conductors of each feeder in pull boxes etc. shall be grouped, tied together, supported, and identified.
6. All conductors in panelboards and other wiring enclosures shall be neatly formed and grouped.
7. All conductors of emergency only and/or normal/emergency shall be run in separate raceway systems to final outlet box.
8. Provide support for conductors in vertical raceways in accordance with Article 300-19.
9. Strip insulation from conductors with approved tools and only of sufficient length for proper termination. Cutting of conductor stranding is unacceptable.
10. Taps from paralleled conductors shall be of a type which tap each conductor, such as ILSCO "PTA" series.
11. Grounding conductors are to be identified as to associate power circuits.

G. Stranded Conductor Installation:

1. If Contractor selects stranded conductors for # 10 AWG and smaller, terminate such conductors as follows:

- a. No stranded conductor may be terminated under a screwhead. Provide insulated terminal lugs for all screw connections equal to Thomas & Betts "STA-KON" type RC with forked tongue and turned up toes. Installation of lugs shall be done with compression tool such as T&B WT-145C which prevents opening of tool until full compression action is completed.
 - b. Backwired wiring devices shall be of clamp type; screw tightened. Force fit connections not allowed.
 - 2. Stranded conductors will not be allowed for fire alarm work.
- H. Accessibility:
 - 1. Electrical equipment requiring service or manual operation shall be accessible.
- I. Vibration Elimination:
 - 1. All equipment connections to rotating equipment or equipment capable of vibration shall be made up by flexible raceways.
- J. Wiring Device Gaskets:
 - 1. Provide wiring device gaskets at cover plates where device is mounted in wall separating conditioned and non-conditioned spaces.

3.9 FEEDER CIRCUITS

- A. Provide feeders as called for on the drawings.
- B. Feeders shall be defined as any circuit originating from the main building switchboard and/or distribution panels.
- C. All feeder conductors shall be continuous from origin to panel or equipment termination without splicing.
- D. All feeders shall be conductors pulled into raceways. Cable systems are not allowed for feeders unless specifically indicated.

3.10 BRANCH CIRCUITS

- A. Provide all branch circuit wiring and outlets for a complete and operating system. The system shall consist of insulated conductors connected to the panelboards and run in raceways or as cable systems if permitted under products section, as required to the final outlet and shall include outlet boxes, supports, fittings, receptacles, plates, fuses, etc.
- B. Physical arrangement of branch circuit wiring shall correspond to circuit numbering on drawings. Combining of circuits and raceways will be allowed up to a 3 phase, 4 wire circuit in a single raceway, unless shared neutrals are not allowed by other sections of this Division, or are indicated as separate neutrals on the drawings. Any combination of homeruns such as this, however, shall be indicated on record drawings. Combining of conductors and raceways for tenant fitup work is allowed only for fitup boxes in accordance with details on drawings. When a common grounded conductor is used for more than one circuit, the arrangement shall be such that a receptacle, fixture, or other device may be removed or disconnected without disconnecting the grounded conductor for other circuits. Ground fault circuit breakers shall be wired with separate neutrals and separate grounding conductors per circuit. A consistent phase orientation shall be adhered to throughout project at terminations.
- C. Circuits feeding three phase equipment shall not be combined into common raceways, unless specifically indicated.

- D. All wiring in panelboards and cabinets shall be neatly formed and grouped.

3.11 CUTTING AND PATCHING

- A. Cutting of surfaces, including core drilling of walls and slabs, shall be done by this contractor as mentioned previously. Openings through new wall surfaces will be provided by others.
- B. Patching will be provided by the trade responsible for the surface to be patched.

3.12 STORAGE AND INSTALLATION OF EQUIPMENT

- A. The electrical subcontractor shall store and install electrical equipment and wiring listed for dry locations.

END OF SECTION