PART I - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

B. The Owner shall not incur any additional costs due to negligence or regulatory requirements imposed upon this project due to the Asbestos Abatement Contractor failing to abide by the requirements of the specifications and applicable regulations.

1.2 SUMMARY

A. Provide all labor, materials, and equipment necessary to complete work of this Section, including but not limited to the following:

1. 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) 454 CMR 28.00 Regulations.

2. The 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 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 Contractor.

3. The Owner shall also reserve the right to research and utilized other information received from any other projects completed by the Contractor for any project not provided under 1.2 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 Contractor based upon this review, for any reason, if found to be in the best interest of the Owner.

B. Items to Be Installed Only: None

C. Items to Be Furnished Only: None

D. Related Sections: None

1.3 ALTERNATIVES

A. Alternates: None

1.4 UNIT PRICES

A. Unit Prices: None.

1.5 DEFINITIONS

A. Site: Refers to the Worcester DPW facility located at 76 East Worcester Street, Worcester, Massachusetts as outlined by contract documents and drawings.

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

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

D. Consultant: Refers to ATLAS Technical Consultant, LLC (ATLAS), 73 William Franks Drive, West Springfield, Massachusetts and their designated, authorized personnel.

E. Contractor: Refers to the Contractor who has been awarded the Contract for performance of asbestos roofing materials abatement work as outlined by this Section.

F. Asbestos Project Designer: The MADLS certified Asbestos Project Designer for this project is Mr. Edward Kolodziej (#AD074321), ATLAS Technical Consultant, LLC.

1.6 SUBMITTALS

A. Refer to Division 1 Section Submittal Procedures for administrative and procedural requirements for submitting Shop Drawings, Product data, Samples, and other miscellaneous submittals.

B. In addition to items required by other sections of the Project Manual, the following submittals are required for review and approval by the Owner on/or before the Pre-Construction Meeting:

1. Copies of notifications
2. Chain-of-Command list of all personnel on-site and emergency contact person(s)
3. Work plan which dictates all removal procedures to be implemented

C. In addition to the items required by other sections of the Project Manual, the following submittals are required for final payment

1. Contractor’s Daily Log Notes
2. Personal Monitoring Results
3. Copy of Waste Shipment Records

1.7 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 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 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 Contractor for failure to perform this requirement and no compensation shall be granted for variations in the quantities presented herein.

C. The Contractor shall begin the work within a mutually agreed upon time with Owner, Architect and General Contractor. Contractor shall work in harmony with all other trades performing separate contract work in the building.

D. The following Scope of Work and Requirements shall be applicable for asbestos abatement work at the Worcester DPW facility located at 76 East Worcester Street, Worcester, MA. If a specific note for an abatement procedure or requirement is not mentioned herein, the Contractor shall perform the removal of such material in accordance with local, state and federal regulations. The Contractor shall also coordinate all work with the General Contractor, as applicable.

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 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 Contractor's responsibility to comply with such regulations as well as any other additional requirements outlined by this Section.

2. The Contractor shall be responsible for all demolition work required to access all asbestos materials for abatement. All demolition debris shall be disposed of as asbestos (unless otherwise directed by the Consultant).

3. Coordination shall exist between the abatement under this Section and the disconnection of existing electrical, plumbing or fire suppression equipment within the building by the Owner.

4. The following requirements shall be applicable for asbestos abatement activities at the site, unless otherwise stated in this section :
   a. Perform abatement of asbestos-containing materials using negative air filtration techniques (estimated at 1-NAFUs for each containment), decontamination chambers, critical barriers, full 2 layer plastic containment's (2-layers of 4-mil poly on walls, and 2-layer of 4-mil poly for ceilings) and the encapsulation of post removal surfaces unless otherwise specified in this Section. Other similar building materials may be in/proximity to the work area but are not part of this abatement project and are outside of this scope.
   b. Establish a decontamination unit in accordance with applicable regulations. Properly sealed (double waste-bagged, cleaned, labeled, etc.) waste materials may be transported through the decontamination unit to the transport vehicle.
   c. Workers shall wear disposable protective suits and respiratory protection for abatement or disturbance of asbestos-containing materials.
   d. Consistently and thoroughly wet asbestos containing materials with a fine spray of amended water. Carefully remove (manual hand-methods) and immediately place asbestos in approved and properly labeled 6-mil polyethylene disposal bags or drums. Surfaces shall be free of visible debris and surfaces shall be wiped clean and/or HEPA vacuumed clean.
   e. All areas must meet visual inspection criteria and final air clearance criteria as described in Section 3.3 and as required by applicable regulations prior to tear down of polyethylene and area clean up.

5. Any damage as a result of the abatement work shall be repaired by the Contractor or compensate City of Worcester.

6. Comply with requirements for final clearance and release of a work area as described in this Section and as required by applicable regulations prior to tear down of polyethylene and area clean up. Perform Final Clearance Visual Inspections in accordance with requirements outlined in Section 3.3.

7. A Non-Traditional Work Plan (NTWP) has been included with the design specifications for this project. The MassDEP NTWP approval is located in Attachment B of the specification. An addendum to the NTWP will be submitted regarding the contractor information for the AQ36 Permit Request once the project has been awarded.

8. Refer to Attachment A (Table 1.0) for a summary of materials that require abatement at the site. In addition, refer to the Drawings for locations identified by Table 1.0.

1.8 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 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 Contractor's responsibility to know, understand, and abide by all such regulations and common practices.

1.9 FEES, PERMITS & LICENSES

A. The 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 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 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 Contractor shall be responsible for the fee or royalty fee and shall disclose the existence of such rights.

B. The Contractor shall be responsible for costs for all licensing requirements, where applicable and notification requirements and all other fees related to the Contractor’s 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.

1.10 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. At the end of each work day the Contractor shall ensure that the building is secured and all exterior areas of the building are free and clear of all work-related debris.

C. 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.

1.11 COORDINATION

A. Extend full cooperation to Owner in all matters involving the use of Owner's facilities. At no time shall the 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. Complete Asbestos activities in the phases of the final schedule agreed upon by Owner.

C. The Contractor shall be made aware that separate contracts will be engaged by the Owner for other work to be performed within the site building. The Contractor shall be made aware that those Contracts will be on-going during the same time as the asbestos abatement work outlined herein. The work of this Contract shall proceed in "harmony" with the work of those projects, which will be subject to coordination by the Owner. No additional compensation or contract time shall be granted for failure to recognize and comply with this requirement.

1.12 SUBSTITUTION OF MATERIALS OR METHODS

A. Owner and Consultant approval is required for all modifications to methods, procedures, and design, which may be proposed by the 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 Consultant. Any such modifications or substitutions to methods, procedures, or design shall comply with applicable regulations. The 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, the 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 Contractor shall assume the cost and the entire responsibility thereto unless performed under the approved Change Order Process.

D. The Owner and Consultant's permission to make such substitution shall not relieve the Contractor from full responsibility for the work.

1.13 SITE SECURITY

A. The Contractor is responsible for performing all work under this contract without contaminating the building or environment with asbestos fibers. This includes interior areas, outside

containment locations, machinery and equipment and any other release into unregulated spaces. The Contractor is responsible for making right and clean-up of any such contamination if found to be present.

B. The Contractor will be responsible for the security of the abatement area, allowing only authorized personnel into the area, and securing assigned entrances and exits at the end of the work day. Signs will be posted prior to asbestos removal as required in 29 CFR 1926.1101.

1.14 PROJECT MONITOR

A. The Owner has retained ATLAS, as their Consultant for technical advisement and project management during the Project. In addition, ATLAS will perform project monitoring services during abatement activities. The Asbestos Abatement Contractor shall regard ATLAS's direction, as authoritative and binding as provided herein, in matters outlined by this Section.

B. ATLAS's licensed Project Monitor, acting as the Owner's Representative, will perform monitoring of the Contractor's 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 have been established in these specifications, and will be strictly enforced. ATLAS'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 Owner.

1.15 TEMPORARY FACILITIES

A. The Contractor shall coordinate the Owner as to the use of the existing power and water within the building.

B. All temporary hook-ups to the existing power and water within the building shall be the responsibility of the Contractor.

C. The Contractor shall also be responsible for providing all temporary toilets required for workers to use during the construction project.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All materials and equipment proposed to be used on this project shall be subject to the acceptance of the Owner and Consultant. The Contractor shall comply with 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 Consultant prior to commencement of the work.

PART 3 - EXECUTION

3.1 WORK PROCEDURES

A. All asbestos abatement work shall take place in accordance with the provisions outlined herein as well as local, state and federal regulations. In particular, Massachusetts DLS and DEP regulations regarding asbestos removal and disposal shall be adhered to.

3.2 DISPOSAL

A. Packaging: Prior to post-abatement inspection, asbestos- containing waste 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 Contractor shall remove the debris accumulated during that day's work activities using procedures outlined in the Specifications. The Contractor shall provide a daily tally of all bags removed.

B. Temporary Storage of Waste: An area for temporary storage of asbestos waste must be approved by the Owner. Asbestos waste may only be stored in an **enclosed container** which is posted and secured whenever not in use. Asbestos 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.

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, except that nonfriable asbestos-containing waste that has not been and does not have a high probability of becoming, crumbled, pulverized, or reduced to powder need not be labeled. 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 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 asbestos-containing materials; except for nonfriable asbestos-containing materials that did not become crumbled, pulverized, or reduced to powder; or a limited quantity of asbestos-containing material which is not being transported by air.

E. EPA vehicle marking: 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 Contractor shall prepare the waste shipment records. Completed waste shipment record(s) signed by the Contractor, all transporter(s), transferor(s), disposal and/or conversion facility(s), shall be provided to the Owner within 30 days of the time at which the asbestos-containing wastes are received at the disposal and/or conversion facility (ies), which shall be no longer than 40 days after the waste was accepted by the initial transporter. The Waste Shipment Record shall specify the designated number of bags or cubic yard(s) of asbestos waste.

G. Depositing: Asbestos waste shall be deposited as soon as practical at a regulated waste disposal site, except for EPA "Category I" nonfriable ACM that has not become friable, nor will be or has

been sanded, ground, cut, or abraded. Waste disposal sites for asbestos materials will be in accordance with 40 CFR 61.25, Waste Disposal Sites. The Contractor shall provide written evidence that the site is approved for asbestos disposal by the EPA, State and local regulatory agencies.

3.3 QUALITY CONTROL AND TESTING

A. The Contractor shall be responsible for achieving acceptable visual inspection for ALL abatement areas as follows:

1. The Work Area and perimeter shall be visually inspected by the Contractor's Site Supervisor and ATLAS's Project Monitor for dust, debris and other particulate residue. The Work Area and perimeter shall be repeatedly cleaned by the Contractor or other entity carrying out the work operation until the no Visible Debris criterion is achieved.

2. 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. The Contractor will be responsible for the costs of visual inspection and testing required for any work which fails the visual inspection.

B. The Asbestos Abatement Contractor shall be responsible for achieving acceptable final air clearance testing for traditional abatement areas as follows:

1. Post-abatement Clearance Air Monitoring: For each abatement area, post abatement clearance air samples will be taken when a visual inspection by ATLAS's Project Monitor detects no visible debris, and surfaces are encapsulated and dry.

2. Phase Contrast Microscopy (PCM) clearance testing will be performed to confirm the completion of removal. All clearance testing shall be performed in accordance with state of Massachusetts Regulations. The work areas shall be considered complete if the following criteria is met:

    a. Containments cleared and samples analyzed by Phase Contrast Microscopy (PCM): Maximum airborne fiber concentration of <0.01 fibers per cubic centimeter.

ATTACHMENT A

TABLE 1.0

SUMMARY OF ACM TO BE ABATED

Table I CITY OF WORCESTER WORCESTER DPW FACILITY		
MATERIAL	**RESULTS**	**NOTES**
Brick Wall Expansion Caulk	4% Chrysotile	Refer to Architectural Drawings
Tar under White Flashing on Brick	2% Chrysotile	Refer to Architectural Drawings
Gray Sealant on Screw Caps	10% Chrysotile	Refer to Architectural Drawings
Gray Patch Material on exhaust Pipe/Roof	3% Chrysotile	Refer to Architectural Drawings
Gray Coating on 9-Light Window Frame	2% Chrysotile	Refer to Architectural Drawings
Glazing on 9-Light Window Frame	4% Chrysotile	Refer to Architectural Drawings

ATTACHMENT B

MASSDEP NON-TRADITIONAL WORK PLAN

73 William Franks Dr.
West Springfield, MA 01089
413.781.0070 | oneatlas.com

August 7, 2026

Ms. Christa Cronk
Asbestos Program Section Chief
Bureau of Air and Waste
MassDEP Central Region Office
8 New Bond Street
Worcester, MA 01606

RE: Non-Traditional Asbestos Abatement Work Plan
Worcester DPW, 76 East Worcester Street, Worcester, MA

Dear Ms. Cronk:

On behalf of the City of Worcester, ATLAS Technical Consultants LLC (ATLAS) is submitting for MassDEP's review, the following Non-Traditional Asbestos Abatement Work Plan ("NTWP") for removal and disposal of asbestos materials located on the roof of the Worcester DPW Facility. Identified asbestos-containing materials will be disturbed during the roof replacement project as follows:

Brick Wall Expansion Caulk	4% Chrysotile
Tar under White Flashing on Brick	2% Chrysotile
Gray Sealant on Screw Caps	10% Chrysotile
Gray Patch Material on exhaust Pipe/Roof	3% Chrysotile
Gray Coating on 9-Light Window Frame	2% Chrysotile
Glazing on 9-Light Window Frame	4% Chrysotile

The NTWP request is based on the safety issues regarding the construction and use of a traditional containment system on the roof. In addition constructing a completely sealed work area on a roof to accomplish removal of the asbestos sealants prevents worker from constructing a sufficiently strong static line for securing themselves to, without creating significant damage to the roof substructure.

The following proposed NTWP incorporates alternative work practices and engineering controls to be implemented during the work.

The NTWP will be applicable to the following regulations:

- 310 CMR 7.15(7)(c) - Work Area Preparations;
- 310 CMR 7.15(7)(e) - Requirements for Work Area Ventilation;
- 310 CMR 7.15(7)(f)1. - Wetting of asbestos prior to removal;

The following parties will be responsible for the work performed at the site.

Owner:	**Asbestos Consultant:**
City of Worcester Department of Public Works Sewer Operations Division 20 East Worcester Street Worcester, MA 01604 Attn: Dylan Ludy, E.I.T. (508) 929-1300	ATLAS Technical Consultants LLC 73 William Franks Drive West Springfield MA 01089 Attn: Edward Kolodziej (413) 426-6819
Architect	**Abatement Contractor**
Nault Architects, Inc. 71 Hope Avenue Worcester, MA 01603 Attn: Steve VanDyke (508)-755-6134	TBD

The following provisions shall be adhered to when performing the work under the NTWP:

1. Notifications

a. The Asbestos Contractor shall submit a completed Asbestos Notification Form (ANF-001) with the appropriate fee, if any, to MassDEP for the asbestos handling operation.
b. All asbestos notifications shall comply with all parts of MassDEP regulation 310 CMR 7.15 and a copy of the notification shall be kept at the Site by the Asbestos Contractor.

2. Training

a. Each and every contractor and sub-contractor working at the site shall be properly trained and have only properly trained personnel at the Site.
b. Each and every asbestos contractor and their workers associated with asbestos abatement activities shall hold current licenses or certifications as either; Asbestos Contractors, Asbestos Supervisors or Asbestos Workers, as appropriate.
c. All of the required licenses shall have been issued by the Commonwealth of Massachusetts' Division of Labor Standards, in accordance with 454 CMR 28.00.

3. Asbestos Project Monitor

a. An Asbestos Project Monitor (“APM”) who has been properly trained in accordance with 454 CMR 28.00 and who holds a current and valid license issued by the MADLS shall be on-site at all time during the asbestos roof removal work.
b. The Asbestos Project Monitor (“APM”) shall review each notification to verify that it is completed and contains all of the requisite information.
c. No work, pursuant to this NTWP, shall commence until this review has been performed and the results of said review recorded in the APM’s Site logbook.

4. Pre-Construction Meeting (NTWP)

a. The APM shall provide copies of the approved NTWP and all additional requirements set forth in any written approval issued by MassDEP, and shall review all aspects with the Owner, Architect, and Roofing Contractor prior to commencing any work pursuant to this NTWP.
b. A written record of each entity attending the review shall be kept by the APM and sent to MassDEP upon their request.
c. The property owner or their representative shall distribute copies of this NTWP to each entity involved with the project.
d. A copy of this NTWP shall be kept at the Site in a central location, for review by all local, state and federal agency personnel, for the duration of the project.

5. Work Procedures – Scope of Work

The following procedures shall be applicable for removal and disposal of the slate roof shingles where associated asbestos-containing materials are disturbed:

a. A Regulated Area shall be established consisting of asbestos barrier tape and asbestos warning signs. The Regulated Area shall be large enough to accommodate the work and keep non-authorized personnel out of the area.
b. A decontamination unit shall be established directly adjacent to the Regulated Area.
c. Windows, doors or vents on the same side of the building where active work is taking place shall be closed.
d. Window, doors or vents within the Regulated Area shall also be sealed with 2 layers of six mil polyethylene sheeting at the exterior side.
e. A drop-cloth of polyethylene sheeting shall be placed under the removal area when removing expansion caulk on brick, gray sealant on screw caps and 9-Light windows with coating.
f. Windows shall be removed according to MassDEP Regulation 310 CMR 7.15 (11) which will include the glazing and gray coating on 9-light windows.
g. 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.
h. All workers shall be properly tied-off to the roof as required by OSHA regulations.
i. All workers performing the work will utilize disposable clothing and Personal Protective Equipment (PPE) as required to the work task including respiratory protection as required by selection chart established in OSHA regulation 29 CFR 1926.1101.
j. All work shall be performed in a slow methodical manner to ensure that no emissions are generated or released. The removal of the asbestos materials shall be removed with standard hand tools and carefully misting the material so as not to cause a slip hazard on the roof. Asbestos material shall be placed in 6-mil asbestos bags once removed.
k. All asbestos-containing waste material ("ACWM") including polyethylene sheeting and PPE shall be sealed into leak tight containers for disposal as ACWM.
l. Following the completion of the work, a visual inspection shall be performed jointly by the Asbestos Abatement Contractor's Site Supervisor and the APM, to ensure that no remnant asbestos debris remains on the roof or within the Regulated Area. Any visible debris observed by the APM or Abatement Contractor shall be cleaned by the Abatement Contractor until no visible debris is observed in accordance with 310 CMR 7.15(8).

m. The APM and Asbestos Abatement Contractor's Supervisor shall sign a "Certificate of Visual Inspection" specifying the work area(s) have met acceptable inspection criteria and reveal no visible or suspect asbestos or other remnant debris and wastes generated during the asbestos removal operation. A record of these visual inspections shall be maintained in the individual's site log books.

6. Equipment Decontamination

a. All equipment and personnel associated with the asbestos abatement operation shall be fully decontaminated using HEPA vacuums and wet methods prior to removal from the Regulated Area and being released to other service.

7. Perimeter Air Monitoring – Asbestos Project Monitor

a. The APM shall perform perimeter air monitoring of the ambient air adjacent to the work area.
b. This area air monitoring shall be performed on a continuous basis during the asbestos abatement operations.
c. Attention shall be paid to the downwind sector to ensure that monitoring points coincide with sensitive receptors.
d. The APM shall have a minimum of two (2) air monitoring stations, however more stations may be required to accomplish adequate monitoring between the Site and sensitive receptors.
e. Analyses of the air samples shall be performed on-site within one (1) hour upon collection and results reported to the APM, Abatement Contractor's Site Supervisor and general contractor's site supervisor forthwith, so that corrections in the work practices can be made immediately.
f. A copy of the results for all perimeter air samples collected each day shall be kept on-site and emailed to the MADEP on request.
g. If the air monitoring results meet or exceed one-one hundredth fiber per cubic centimeter (0.010 f/cc) of air, then all work shall stop. The work methods shall be evaluated by the APM, the Abatement Contractor's Site Supervisor prior to continuing any further work. MassDEP shall be notified immediately on that same day of the air monitoring exceedance and the updated emission control procedures.

8. Air Sample Collection and Analysis Procedures (Employee and Perimeter Monitoring)

a. The device used to measure the flow rates for the perimeter and employee air monitoring samples shall have been calibrated by a primary calibration device within six (6) months of utilization at the Site.
b. A record of the calibration record for the measurement device used at the Site shall be kept at the Site for the duration of the project and a copy of each calibration record shall be submitted to MassDEP prior to commencing any work pursuant to this NTWP.
c. Analyses of the employee and perimeter air samples shall be performed by consultants who are properly trained, are successful participants in the American Industrial Hygiene Association's Asbestos Analytical Registry (AIHA's AAR), are considered proficient with the most recent "PAT" rounds, or alternatively, who are employees of a laboratory, which is licensed by the Commonwealth to perform such analysis and which is accredited with either the AIHA or National Voluntary Laboratory Accreditation Program (NVLAP), as appropriate.

9. General Conditions of Agreement

a. No work pursuant to this NTWP shall commence unless the APM is at the Site and all air monitoring stations, both perimeter and employee monitoring, are in full operation.

b. This NTWP applies specifically to the removal of the asbestos materials located on the roof at the Worcester DPW Facility, 76 East Worcester Street, Worcester, MA.
c. This NTWP does not apply to any past or future asbestos handling at the site.
d. All other MassDEP regulations are in force for the balance of this asbestos abatement operation.
e. This work plan does not negate the responsibility of the property owner, the contractor, subcontractors and consultants from complying with all other applicable federal, state and local regulations.

10. Timeframe of Approval

a. This Work Plan is valid as stipulated by the MassDEP.
b. If activities are to continue past the expiration date after this Plan is approved by MassDEP; the MassDEP shall be contacted to determine if a request for an extension shall be submitted or resubmittal of the NT Permit and Work Plan, with applicable fees, for their approval/renewal.

11. Changes in Conditions

a. Any variance from the proposed conditions listed above shall be evaluated by MassDEP prior to commencement of any such activities.
b. All requests for changes to or amendments of this NTWP shall be made to the MassDEP in writing.

12. Recording Keeping

a. All documentation regarding air monitoring collection procedures and analysis results, visual inspections and waste disposal shall be kept on site for inspection by MassDEP personnel for the duration of the removal operation.
b. Copies of the documentation are to be supplied to MassDEP within thirty (30) days of completion of the work.

I appreciate your attention regarding this matter and look forward to hearing your response. If you have any questions, please do not hesitate to contact me at (413) 781-0070.

Sincerely,
ATLAS Technical Consultants LLC

Edward Kolodziej
Senior Project Manager (AD074321)

Brian Williams
Area Manager

73 William Franks Dr.
West Springfield, MA 01089
413.781.0070 | oneatlas.com

Figure 1- Brick Wall Expansion Caulk

Figure 2 - Tar under White Flashing on Brick

Figure 3 - Gray Sealant on Screw Caps (Parapet Wall)

Figure 4 - Gray Patch Material on Exhaust Pipe

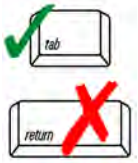
Figure 5 - Gray Coat on 9-Light Window

Figure 6 - Glazing on 9-Light Windows

Massachusetts Department of Environmental Protection
Bureau of Air & Waste
AQ 36 Application for Non-Traditional Asbestos Abatement Work Practice Approval

A. Work Site Information

Important: When completing forms on a computer, use only the tab key to move your cursor - do not use the return key.



Facility

Worcester DPW Facility
Facility Name or Site Description

76 East Worcester Street
Facility Address

Worcester	MA	01604
City/Town	State	ZIP Code

Owner

City of Worcester
Owner Name

20 East Worcester Street
Owner Address

Worcester	MA	01604
City/Town	State	ZIP Code

508-929-1300	LudyD@worcesterma.gov
Telephone Number	Email Address

Applicant - ☐ Check here if same as Owner and skip to next section. Otherwise, complete fields below.

Edward Kolodziej
Applicant Name

73 William Franks Drive
Applicant Address

West Springfield	MA	01089
City/Town	State	ZIP Code

413-781-0070	edward.kolodziej@oneatlas.com
Telephone Number	Email Address

B. Project Information

Asbestos Project Designer & Consulting Service Provider

Edward Kolodziej
Asbestos Project Designer Name

AD074321	08/28/2026
DLS Project Designer License Number	Expiration Date (MM/DD/YYYY)

ATLAS Technical Consultants LLC
Consulting Service Provider Name

AF22	04/14/2027
DLS Consulting Service Certification Number	Expiration Date (MM/DD/YYYY)

73 William Franks Drive
Address

West Springfield	MA	01089
City/Town	State	ZIP Code

413-781-0070	edward.kolodziej@oneatlas.com
Telephone Number	Email Address

Continue to the Next Page ➔

Massachusetts Department of Environmental Protection
Bureau of Air & Waste
AQ 36 Application for Non-Traditional Asbestos Abatement Work Practice Approval

B. Project Information (continued)

Asbestos Project Monitor & Consulting Service Provider

Edward Kolodziej
Asbestos Project Monitor Name

AM001903 | 8/28/2026
DLS Asbestos Project Monitor Certification Number | Expiration Date (MM/DD/YYYY)

ATLAS Technical Consultants, LLC
Consulting Service Provider Name

AF22 | 04/14/2027
DLS Consulting Service Certification Number | Expiration Date (MM/DD/YYYY)

73 William Franks Drive
Address

West Springfield | MA | 01089
City/Town | State | ZIP Code

413-781-0070 | edward.kolodziej@oneatlas.com
Telephone Number | Email Address

Asbestos Abatement Contractor

Contractor Name

DLS Contractor Certification Number | Expiration Date (MM/DD/YYYY)

Address

City/Town | State | ZIP Code

Telephone Number | Email Address

Demolition Contractor (If Applicable)

N/A
Contractor Name

Address

City/Town | State | ZIP Code

Telephone Number | Email Address

Circumstances – Explain why a Non-Traditional Asbestos Abatement Work Practice Approval is needed.

Note: Check all applicable boxes.

- ☐ Facility is being demolished under a state or local government order because it is structurally unsound and in danger of imminent collapse. (Please attach a copy of the order to your work plan proposal.)
- ☐ Asbestos Containing Material (ACM) or Asbestos Containing Waste Material (ACWM) was not accessible for testing, thus not discovered until after demolition began and, as a result, cannot be safely removed.
- ☐ Abatement activity is being conducted as part of an emergency renovation operation.
- ☐ Asbestos abatement activity is being conducted to clean up and decontaminate all or part of a facility where:
  - ☐ Previous asbestos abatement activities were not conducted in compliance with 310 CMR 7.15, or
  - ☒ ACM deterioration, if not immediately attended to, would present a safety or public health hazard.
- ☐ Wetting during a facility renovation would unavoidably damage equipment or present a safety hazard.
- ☐ The project requires bulk loading of ACM and/or ACWM.

Massachusetts Department of Environmental Protection
Bureau of Air & Waste
AQ 36 Application for Non-Traditional Asbestos Abatement Work Practice Approval

B. Project Information (continued)

List the requirements of 310 CMR 7.15 that you are unable to comply with and explain why:

7.15 (7)(c); 7.15 (7)(e); 7.15 (7)(f)(1)

Other Project Details

Project Start Date: TBD (MM/DD/YYYY)

Project End Date: TBD (MM/DD/YYYY)

Types & Amounts of ACM and/or ACWM Requiring Non-Traditional Asbestos Abatement Work Practice(s):

☐ Friable _____ Quantity in Cubic Meters (Cubic Yards)

☒ Non-Friable 40 Quantity in Cubic Meters (Cubic Yards)

Location(s) of ACM in the Facility:

Exterior , Roof

C. Certification

"I certify that I have personally examined the foregoing and am familiar with the information contained in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including possible fines and imprisonment. I am aware that this permit application or notification shall not be deemed valid unless payment of the applicable fee is made."

Signature

Edward Kolodziej
Printed Name

Senior Project Manager
Title

08/07/2026
Date (MM/DD/YYYY)

Continue to the Next Page ➔

Massachusetts Department of Environmental Protection
Bureau of Air & Waste
AQ 36 Application for Non-Traditional Asbestos Abatement Work Practice Approval

D. Submission of Application

Note: MassDEP review will begin only after your submissions have been received at both locations.

STEP 1: Submit Application

Send the following materials to the appropriate MassDEP Regional Office*, Attention: Asbestos Section:

☒ This original completed and signed form.

☒ A copy of the check or money order referenced in Step 2.

☒ Your proposed work plan, describing work practices, duration, and schedule. The proposal must:

- Include signature of the Asbestos Project Designer who prepared it.
- Demonstrate that the deviations from 310 CMR 7.15 and alternatives proposed will not cause any visible emissions to the outside air or pose significant risk to public health, safety or the environment.

☒ All supporting documentation.

*Find the MassDEP Regional Office for the community where this work will be done: https://www.mass.gov/service-details/massdep-regional-offices-by-community

STEP 2: Submit Fee Payment

Send the materials below to this address:

MassDEP
P.O. Box 4062
Boston, MA 02211

☒ A copy of this completed and signed form.

☐ Fee payment of $600* (check or money order payable to “Commonwealth of Massachusetts”).

*The following entities are exempt from this fee:

- Cities, towns, counties or districts of the Commonwealth
- Federally recognized Indian tribe housing authorities
- Municipal housing authorities
- The Massachusetts Bay Transportation Authority (MBTA)

Is this a fee-exempt project? ☒ Yes ☐ No

NOTE: Entities that are exempt from the fee must still submit a copy of this completed and signed form, without payment, to the P.O. box above.

LIMITED ASBESTOS INSPECTION REPORT

WORCESTER DPW ROOF
76 EAST WORCESTER STREET
Worcester, MA

PREPARED FOR:

Mr. Steve VanDyke
Nault Architects
71 Hope Avenue
100 Grove Street, Suite 303
Worcester, MA 01603

PREPARED BY:

Atlas Technical Consultants LLC
73 William Franks Drive
West Springfield, MA 01089

October 9, 2025

73 William Franks Drive
West Springfield, MA 01089
(413) 781-0070 | oneatlas.com

October 9, 2025

Atlas No. 183BW25194

Mr. Steve VanDyke
NAULT ARCHITECTS
71 Hope Avenue
Worcester, MA. 010603

Subject: Limited Asbestos Inspection Report
Worcester DPW Roof
76 East Worcester Street
Worcester, MA

Dear Mr. VanDyke:

The enclosed Asbestos Inspection Report was performed and prepared by Atlas Technical Consultants LLC (ATLAS). The survey included a limited inspection of 76 East Worcester Street in Worcester, MA. Atlas's inspection was limited to proposed roof replacement. The scope of the renovations was determined by Nault Architects. Atlas' visual observations and laboratory reports forms the basis for the conclusions contained in this report.

The following licensed and accredited inspector performed the inspection on September 22, 2025. If you have any questions, please contact the undersigned.

Respectfully submitted,

James Lowell
Massachusetts Asbestos Inspector #: AI074251
Phone: 413-504-1674
Email: James.Lowell@oneatlas.com

Brian Williams
Area Manager
Phone: 413-348-4479
Email: brian.williams@oneatlas.com

Distribution: admin@naultarchitects.com

CONTENTS

APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

ACBM	Asbestos-Containing Building Material
ACM	Asbestos-Containing Material
AHERA	Asbestos-Hazard Emergency Response Act
CFR	Code of Federal Regulations
DPH	Department of Public Health
EPA	Environmental Protection Agency
NESHAP	National Emission Standards for Hazardous Air Pollutants
NOB	Non-Friable Organically Bound
OSHA	Occupational Safety and Health Administration
PACM	Presumed Asbestos-Containing Material
PLM	Polarized Light Microscopy
RACM	Regulated Asbestos-Containing Building Material
TEM	Transmission Electron Microscopy

1. SITE DESCRIPTION

This report addresses sampling at the 76 Worcester Street roof only. The building's construction date was unknown at the time of the survey.

1.1 SURVEY LIMITATIONS

The interior of the building was occupied at the time of the survey. Limited destructive investigation techniques were used in this survey. Suspect lead, PCB, asbestos, mercury or other hazardous materials may exist at inaccessible areas of the building or grounds that could not be evaluated during this study. These areas include but are not limited to.

- Interior of floors, walls and ceiling cavities
- Foundation waterproofing systems
- Underground pipe tunnels and chases
- Gaskets on equipment, tanks, pipe, etc.
- Building plumbing systems
- Electrical wiring
- Pipe and duct wall penetrations

A number of regulated materials may also be present in the facility that were not evaluated as part of this study including but not limited to containerized wastes, hydraulic equipment, extinguishing systems, life safety equipment, etc.

2. ASBESTOS INSPECTION

Atlas's Scope of Work included a limited Asbestos Inspection of the above referenced building. Outlined below is a description of Atlas's testing methodology.

2.1 ASBESTOS PROTOCOL

Atlas preformed a limited pre-renovation/demolition survey to identify suspect asbestos-containing materials in the above referenced roof. The Asbestos Inspection included a visual assessment of accessible suspect asbestos-containing materials and subsequent bulk sampling and analysis.

EPA and OSHA define ACBM as any material containing greater than one percent (>1%) asbestos. The ACBM inspection and bulk sampling was performed in accordance with the methods outlined in the U.S. EPA guidance document titled, Guidance for Controlling Asbestos-Containing Materials in Buildings (Document No. 560/5-85/024). In addition, bulk sampling of asbestos was performed in general accordance with 40 CFR Part 763 Asbestos Hazard Emergency Response Act (AHERA) requirements for number of samples and types of ACBM to be sampled. According to these requirements, materials are classified as either surfacing (e.g., ceiling plaster, wall plaster, spray-applied fireproofing), thermal system insulation (e.g., pipe

insulation, pipe fitting insulation, boiler insulation), or miscellaneous materials (e.g., floor tile, ceiling tile, wallboard). The number of samples collected from each material varies based on the classification of the material and increases as the potential for a non-uniform mixture of asbestos in the material increases.

Samples collected for asbestos analysis were obtained by qualified and certified (Certified State of Massachusetts Site Inspector) personnel utilizing proper safety measures such as wetting the material prior to sampling, cleaning up the area by wet wiping any resulting residual debris, and wearing proper protective equipment, as needed. In order to be certain of sampling the entire thickness of a material, coring tools and knives were utilized to penetrate all layers of a material. All collected samples were then placed in appropriately labeled airtight containers for shipment to the laboratory for analysis.

2.2 ASBESTOS ANALYSIS

All samples collected were transported under chain-of-custody protocol to EMSL lab in New York, NY. Bulk samples were analyzed for asbestos content using Polarized Light Microscopy (PLM) with Dispersion Staining (EPA Method 600/R-93/116 and/or EPA Method 600/M4-82-020: Interim Method for the Determination of Asbestos in Bulk Building Materials). One sample from each group was analyzed by TEM via EPA/600/R-93/116 Section 2.5.5.1. To qualify as asbestos-containing, the material must be determined to contain greater than or equal to one percent (≥1%) from a homogeneous material area set of samples.

Consequently, according to the EPA/AHERA and State of Massachusetts Department of Environmental Protection criteria, all bulk samples from a homogeneous area must be found to contain less than one percent (<1%) asbestos in order to be classified as non-asbestos-containing. MassDEP also requires materials that contain any asbestos (<1%) be handled and disposed of as asbestos containing material.

3. FINDINGS

Refer to the following Attachments for a summary of each tested material, location, analytical and results and abatement cost estimates:

I SUMMARY OF ASBESTOS-CONTAINING MATERIALS
II LIST OF ASBESTOS-CONTAINING MATERIALS
III LIST OF NON-ASBESTOS MATERIALS
IV LABORATORY REPORTS AND CHAIN OF CUSTODY
V PHOTO LOG
VI DRAWING

4. CONCLUSIONS

Asbestos containing materials were identified in roofing materials in areas of the roof inspected by Atlas. The following response actions are required to be implemented to properly manage hazardous materials at the site:

A. In accordance with EPA's National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations, all materials found to be asbestos-containing in the building will be required to be abated prior to renovation/demolition activities. In addition, all asbestos abatement work is required to be performed by a Massachusetts state licensed Asbestos Abatement Contractor in accordance with local, state and federal regulations.

B. Any suspect asbestos-containing material discovered during the course of renovation/demolition which is not included in this report shall be assumed to be asbestos-containing until further bulk sampling and analysis is performed.

C. The Massachusetts Department of Environmental Protection (DEP), as well as the U.S. Environmental Protection Agency (EPA) currently recognize Polarized Light Microscopy (PLM) analysis as an acceptable analytical method for determining the Asbestos content in non-friable, organically bound (NOB) materials.

However, comparative studies between PLM analysis and Transmission Electron Microscopy (TEM) analysis have shown that PLM analysis may yield false negative analytical results for NOB's such as floor tiles.

Atlas recommends that, prior to Renovation/Demolition activities, one sample from each homogeneous area of floor tiles and other non-friable organically bound (NOB) materials that originally tested negative by PLM undergo confirmatory analysis by TEM, utilizing ELAP-198.4 TEM Method for Identifying and Quantifying Asbestos in NOB bulk samples. One sample from each group was analyzed by TEM via EPA/600/R-93/116 Section 2.5.5.1.

D. For materials which contain less than 1 percent asbestos several OSHA requirements still apply if the asbestos permissible exposure limit (PEL) is exceeded or might be exceeded. These include requirements regarding:

- the use of wet methods
- prompt clean-up and disposal of waste and debris contaminated with asbestos in leak tight containers
- and record keeping requirements associated with negative exposure assessment

MassDEP also requires materials that contain any asbestos (<1%) be handled and disposed of as asbestos containing material.

E. All demolition work, which disturbs lead-containing materials, will be subject to OSHA 29 CFR 1926.62 "Lead in Construction Regulations". Under OSHA, the employer is responsible for protection of their employees when performing renovation and/or demolition work which disturbs lead materials. Compliance shall include written programs, medical monitoring, exposure assessment testing and engineering controls.

NOTE: Any lead waste streams generated during demolition must have a leachate characterization (TCLP) performed prior to disposal. Other regulated metals (e.g. chromium, cadmium, etc.) may be present in paint that were not evaluated as part of this limited survey.

F. To comply with OSHA's Hazard Communication Standard, (29 CFR 1910.1200) workers shall be notified of the presence of lead, asbestos, mercury or PCB in building materials and trained on proper handling methods. This shall include, but not be limited to:

- wearing work clothes and gloves
- washing hands prior to eating
- not smoking or eating within the work area
- employing methods that minimize the generation of dust when disturbing materials to the extent practicable.

G. Prior to the start of the work, hazardous material abatement specifications shall be developed to outline project requirements. Air monitoring shall be performed to determine the effectiveness of abatement. The Contractor shall be required to provide a written description detailing the means and methods to achieve compliance with the provisions outlined herein.

H. For hazardous materials left in place, establish an operation and maintenance program to ensure that workers:

- Are made aware of hazardous materials locations through training or hazard labeling
- Regularly inspect hazardous materials and maintain in good condition
- Utilize personal protective equipment if exposed to hazard materials

APPENDIX I
SUMMARY OF ASBESTOS-CONTAINING MATERIALS

Summary of Asbestos-Containing Materials 76 Worcester Street Worcester MA
Brick Wall Expansion Caulk Tar Under White Flashing on Brick Gray Sealant on Screw Caps Gray Patch Material on Exhaust Pipe/Roof Glazing on 9-Light Metal Window Gray Coating on 9-Light Window Frame

APPENDIX II
LIST OF ASBESTOS-CONTAINING MATERIALS

Asbestos-Containing Materials Table 76 Worcester Street Worcester MA			
Material Description	**Location**	**Estimated Quantity**	**Notes Number-76W-**
Brick Wall Expansion Caulk	**North Wall**	**Refer to Architect Drawing**	**01A&B 4% Chrysotile**
Tar Under White Flashing on Brick	**Parapet Wall North**	**Refer to Architect Drawing**	**06A&B 2% Chrysotile**
Gray Sealant on Screw Caps	**North/East Parapet Wall**	**Refer to Architect Drawing**	**07A&B 10% Chrysotile**
Gray Patch Material on Exhaust Pipe/Roof	**Roof A**	**Refer to Architect Drawing**	**10A&B 3% Chrysotile**
Glazing on 9-Light Metal Window	**Roof B**	**Refer to Architect Drawing**	**11A&B 4% Chrysotile**
Gray Coating on 9-Light Window Frame	**Roof B**	**Refer to Architect Drawing**	**13A-C 2%Chrysotile**

APPENDIX III
LIST OF NON-ASBESTOS MATERIALS

Non-Asbestos Materials Table 76 Worcester Street Worcester MA		
Material Description	**Location**	**Bulk Sample Reference # Number-76W-**
Brick Wall Mortar	Exterior	02A&B
Brick Wall	Exterior	03A&B
Roof Composite #1	A-Roof North	04A
White Flashing on Brick	Roof A Parapet Wall	05A&B
Roof Composite #2	A-Roof East	08A
Rubber Patch on Metal Parapet Wall Seam Cap	Roof A Parapet Wall	09A&B
Roof Composite #3	Roof B	12A
Gray Air Vent Frame Caulk	Roof B	14A&B
Roof Composite #4	Roof A West	15A

APPENDIX IV
LABORATORY REPORTS AND CHAIN OF CUSTODY

EMSL Analytical, Inc.
10-39 45th Road Long Island City, NY 11101
Tel/Fax: (212) 290-0051 / (212) 290-0058
http://www.EMSL.com / manhattanlab@emsl.com

EMSL Order: 032513165
Customer ID: ATC62
Customer PO: 11-81-0030
Project ID:

Attention: Brian Williams
Atlas Technical
73 William Franks Drive
West Springfield, MA 01089

Phone:
Fax: (413) 781-3734
Received Date: 09/23/2025 9:41 AM
Analysis Date: 09/27/2025 - 09/29/2025
Collected Date: 09/22/2025

Project: 183BW25194/ Worcester DPW/ 76 East Worcester St., Worcester, MA

Test Report: Asbestos Analysis of Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
76W-01a *032513165-0001*	North Side - Brick Wall Expansion Caulk	Gray/White Non-Fibrous Homogeneous		33% Ca Carbonate 67.0% Non-fibrous (Other)	**None Detected**
76W-01b *032513165-0002*	North Side - Brick Wall Expansion Caulk	Brown/Gray Non-Fibrous Homogeneous	30% Cellulose	30% Ca Carbonate 36.0% Non-fibrous (Other)	**4% Chrysotile**
		The sample group is not homogeneous			
76W-02a *032513165-0003*	North Side - Brick Wall Mortar	Gray Non-Fibrous Homogeneous		50% Quartz 15% Ca Carbonate 35.0% Non-fibrous (Other)	**None Detected**
76W-02b *032513165-0004*	North Side - Brick Wall Mortar	White Non-Fibrous Homogeneous		50% Quartz 10% Ca Carbonate 40.0% Non-fibrous (Other)	**None Detected**
76W-03a *032513165-0005*	North Side - Brick Wall	Red Non-Fibrous Homogeneous		3% Quartz 10% Ca Carbonate 87.0% Non-fibrous (Other)	**None Detected**
76W-03b *032513165-0006*	North Side - Brick Wall	Red Non-Fibrous Homogeneous		5% Quartz 30% Ca Carbonate 65.0% Non-fibrous (Other)	**None Detected**
76W-04a *032513165-0007*	North A Side Roof - Roof Composite #1	Brown/Black Non-Fibrous Homogeneous	50% Cellulose	50.0% Non-fibrous (Other)	**None Detected**
76W-05a *032513165-0008*	Parapet Wall North - White Flashingon Brick Parapet Wall				**Not Analyzed**
		Sample material is metal, not analyzable by PLM			
76W-05b *032513165-0009*	Parapet Wall East - White Flashingon Brick Parapet Wall				**Not Analyzed**
		Sample material is metal, not analyzable by PLM			

Initial report from: 09/29/2025 11:06:07

EMSL Analytical, Inc.
10-39 45th Road Long Island City, NY 11101
Tel/Fax: (212) 290-0051 / (212) 290-0058
http://www.EMSL.com / manhattanlab@emsl.com

EMSL Order: 032513165
Customer ID: ATC62
Customer PO: 11-81-0030
Project ID:

Attention: Brian Williams
Atlas Technical
73 William Franks Drive
West Springfield, MA 01089

Phone:
Fax: (413) 781-3734
Received Date: 09/23/2025 9:41 AM
Analysis Date: 09/27/2025 - 09/29/2025
Collected Date: 09/22/2025

Project: 183BW25194/ Worcester DPW/ 76 East Worcester St., Worcester, MA

Test Report: Asbestos Analysis of Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
76W-06a *032513165-0010*	Parapet Wall North - Tar Under White Flashingon Brick Parapet Wall	Black Non-Fibrous Homogeneous		98.0% Non-fibrous (Other)	**2% Chrysotile**
76W-06b *032513165-0011*	Parapet Wall East - Tar Under White Flashingon Brick Parapet Wall				**Positive Stop (Not Analyzed)**
76W-07a *032513165-0012*	Parapet Wall North - Gray Sealant on Screw Caps	Black Non-Fibrous Homogeneous		90.0% Non-fibrous (Other)	**10% Chrysotile**
76W-07b *032513165-0013*	Parapet Wall East - Gray Sealant on Screw Caps				**Positive Stop (Not Analyzed)**
76W-08a *032513165-0014*	Roof A East Side - Roof Composite #2	Black Non-Fibrous Homogeneous		100.0% Non-fibrous (Other)	**None Detected**
76W-09a *032513165-0015*	Parapet Wall North - Rubber Patch on Metal Parapet Wall Seam	Black Non-Fibrous Homogeneous		100.0% Non-fibrous (Other)	**None Detected**
76W-09b *032513165-0016*	Parapet Wall East - Rubber Patch on Metal Parapet Wall Seam	Black Non-Fibrous Homogeneous		100.0% Non-fibrous (Other)	**None Detected**
76W-10a *032513165-0017*	Roof A - Gray Patch Material on Exhaust/ Roof	Black Non-Fibrous Homogeneous		97.0% Non-fibrous (Other)	**3% Chrysotile**
76W-10b *032513165-0018*	Roof A - Gray Patch Material on Exhaust/ Roof				**Positive Stop (Not Analyzed)**

Initial report from: 09/29/2025 11:06:07

EMSL Analytical, Inc.
10-39 45th Road Long Island City, NY 11101
Tel/Fax: (212) 290-0051 / (212) 290-0058
http://www.EMSL.com / manhattanlab@emsl.com

EMSL Order: 032513165
Customer ID: ATC62
Customer PO: 11-81-0030
Project ID:

Attention: Brian Williams
Atlas Technical
73 William Franks Drive
West Springfield, MA 01089

Phone:
Fax: (413) 781-3734
Received Date: 09/23/2025 9:41 AM
Analysis Date: 09/27/2025 - 09/29/2025
Collected Date: 09/22/2025

Project: 183BW25194/ Worcester DPW/ 76 East Worcester St., Worcester, MA

Test Report: Asbestos Analysis of Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
76W-11a *032513165-0019*	B - Roof (Metal Windows) - Glazing on 9-Light Metal Windows	Gray Non-Fibrous Homogeneous		50% Ca Carbonate 46.0% Non-fibrous (Other)	**4% Chrysotile**
76W-11b *032513165-0020*	B - Roof (Metal Windows) - Glazing on 9-Light Metal Windows				**Positive Stop (Not Analyzed)**
76W-12a-Cove Base *032513165-0021*	B - Roof - Roof Composite #3	Black Non-Fibrous Homogeneous		100.0% Non-fibrous (Other)	**None Detected**
76W-12a-Roofing *032513165-0021A*	B - Roof - Roof Composite #3	Brown Non-Fibrous Homogeneous	95% Cellulose	5.0% Non-fibrous (Other)	**None Detected**
76W-13a *032513165-0022*	B - Roof East Side - Gray Coat on 9-Light Window Frame	Black Non-Fibrous Homogeneous		4% Quartz 50% Ca Carbonate 44.0% Non-fibrous (Other)	**2% Chrysotile**
76W-13b *032513165-0023*	B - Roof North Side - Gray Coat on 9-Light Window Frame				**Positive Stop (Not Analyzed)**
76W-13c *032513165-0024*	B - Roof West Side - Gray Coat on 9-Light Window Frame				**Positive Stop (Not Analyzed)**
76W-14a *032513165-0025*	B - Roof East Side - Gray Air Vent Frame Caulk	Gray Non-Fibrous Homogeneous		10% Ca Carbonate 90.0% Non-fibrous (Other)	**None Detected**
76W-14b *032513165-0026*	B - Roof East Side - Gray Air Vent Frame Caulk	Gray Non-Fibrous Homogeneous		10% Ca Carbonate 90.0% Non-fibrous (Other)	**None Detected**

Initial report from: 09/29/2025 11:06:07

EMSL Analytical, Inc.
10-39 45th Road Long Island City, NY 11101
Tel/Fax: (212) 290-0051 / (212) 290-0058
http://www.EMSL.com / manhattanlab@emsl.com

EMSL Order: 032513165
Customer ID: ATC62
Customer PO: 11-81-0030
Project ID:

Attention: Brian Williams
Atlas Technical
73 William Franks Drive
West Springfield, MA 01089

Phone:
Fax: (413) 781-3734
Received Date: 09/23/2025 9:41 AM
Analysis Date: 09/27/2025 - 09/29/2025
Collected Date: 09/22/2025

Project: 183BW25194/ Worcester DPW/ 76 East Worcester St., Worcester, MA

Test Report: Asbestos Analysis of Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
76W-15a-Tar *032513165-0027*	Roof A West Side - Roof Composite #3	Brown Non-Fibrous Homogeneous	10% Cellulose	5% Ca Carbonate 85.0% Non-fibrous (Other)	**None Detected**
76W-15a-Roofing *032513165-0027A*	Roof A West Side - Roof Composite #3	Brown Fibrous Homogeneous	35% Cellulose	65.0% Non-fibrous (Other)	**None Detected**

Initial report from: 09/29/2025 11:06:07

EMSL Analytical, Inc.
10-39 45th Road Long Island City, NY 11101
Tel/Fax: (212) 290-0051 / (212) 290-0058
http://www.EMSL.com / manhattanlab@emsl.com

EMSL Order: 032513165
Customer ID: ATC62
Customer PO: 11-81-0030
Project ID:

Attention: Brian Williams
Atlas Technical
73 William Franks Drive
West Springfield, MA 01089

Phone:
Fax: (413) 781-3734
Received Date: 09/23/2025 9:41 AM
Analysis Date: 09/27/2025 - 09/29/2025
Collected Date: 09/22/2025

Project: 183BW25194/ Worcester DPW/ 76 East Worcester St., Worcester, MA

The samples in this report were submitted to EMSL for analysis by Asbestos Analysis of Bulk materials via EPA/600 (0513) Method using Polarized Light Microscopy. The reference number for these samples is the EMSL Order ID above. Please use this reference number when calling about these samples.

Report Comments:

Sample Receipt Date:	09/23/2025	Sample Receipt Time:	9:41 AM
Analysis Completed Date:	09/29/2025	Analysis Completed Time:	10:09 AM

Analyst(s):

Aldo Atemis PLM (14)

Madison Fragoso PLM (7)

Samples Reviewed and approved by:

Charles Johnson, Laboratory Manager
or other approved signatory

Initial report from: 09/29/2025 11:06:07

Relinquished by:		Date/Time:	09-22-2025
Received by:		Date/Time:	9/23/25 9:41am
Relinquished by:		Date/Time:	
Received by:		Date/Time:	
Relinquished by:		Date/Time:	
Received by:		Date/Time:	

032513165

EMSL--New York

10-39 45th Road
Long Island City, NY 11101
(212) 290-0051

2025 SEP 23 A 9:41

Company Name: Atlas Technical		
Company Address: 73 William Franks Rd		
City: West Springfield State: MA Zip: 01089		
Phone: (413) 781-0070	Project Name: Worcerter DPW	Analysis Type: PLM CS
Brian.williams@oneatlas.com	Project Address: 76 East Worceter st. Worcester. Ma	Positive Stop: Yes
Results to:	Project Manager: Brian Williams	Turnaround Time 5 Days
Verbal Results: Yes No	Project Number: 183BW25194	Fax Copy by:
Cell or Pager 413-348-4479	Sampled by: Jim Lowell Date: 09-22-2025	Return Samples: Yes No
Site Fax:	Special Instructions Analysis All Composite Roof Sample Layers	
Additional Fax:		

Lab ID	Field ID	Location	Sample Description	Homogenous Area #
	76W-01a	North Side	Brick Wall Expansion Caulk	1
	76W-01b	North Side	Brick Wall Expansion Caulk	1
	76W-02a	North Side	Brick Wall Mortar	2
	76W-02b	North Side	Brick Wall Mortar	2
	76W-03a	North Side	Brick Wall	3
	76W-03b	North Side	Brick Wall	3
	76W-04a	North A Side Roof	Roof Composite #1	4
	76W-05a	Parapet Wall North	White Flashingon Brick Parapet Wall	5
	76W-05b	Parapet Wall East	White Flashingon Brick Parapet Wall	5
	76W-06a	Parapet Wall North	Tar Under White Flashingon Brick Parapet Wall	6
	76W-06b	Parapet Wall East	Tar Under White Flashingon Brick Parapet Wall	6
	76W-07a	Parapet Wall North	Gray Seaalant on Screw Caps	7
	76W-07b	Parapet Wall East	Gray Seaalant on Screw Caps	7
	76W-08a	Roof A East Side	Roof Composite #2	8

OrderID: 032513165

Relinquished by:		Date/Time:	09-22-2025
Received by:		Date/Time:	9/23/25 9:41Am
Relinquished by:		Date/Time:	
Received by:		Date/Time:	
Relinquished by:		Date/Time:	
Received by:		Date/Time:	

0325|3165

EMSL--New York

2025 SEP 23 A 9:41

10-39 45th Road
Long Island City, NY 11101
(212) 290-0051

Company Name: Atlas Technical		
Company Address: 73 William Franks Rd		
City: West Springfield State: MA Zip: 01089		
Phone: (413) 781-0070	Project Name: Worcerter DPW	Analysis Type: PLM
Brian.williams@oneatlas.com	Project Address: 76 East Worceter st. Worcester. Ma	Positive Stop: Yes
Results to:	Project Manager: Brian Williams	Turnaround Time 5 Days
Verbal Results: Yes No	Project Number: 183BW25194	Fax Copy by:
Cell or Pager 413-348-4479	Sampled by: Jim Lowell Date: 09-22-2025	Return Samples: Yes No
Site Fax:	Special Instructions Analysis All Composite Roof Sample Layers	
Additional Fax:		

Lab ID	Field ID	Location	Sample Description	Homogenous Area #
	76W-09a	Parapet Wall North	Rubber Patch On Metal Parapet Wall Seam	9
	76W-09b	Parapet Wall East	Rubber Patch On Metal Parapet Wall Seam	9
	76W-10a	Roof A	Gray Patch Material on Exhaust/Roof	10
	76W-10b	Roof A	Gray Patch Material on Exhaust/Roof	10
	76W-11a	B-Roof (Metal Windows)	Glazing on 9-Light Metal Windows	11
	76W-11b	B-Roof (Metal Windows)	Glazing on 9-Light Metal Windows	11
	76W-12a	B-Roof	Roof Composite #3	12
	76W-13a	B-Roof East Side	Gray Coat On 9-Light Windoe Frame	13
	76W-13b	B-Roof North Side	Gray Coat On 9-Light Windoe Frame	13
	76W-13c	B-Roof West Side	Gray Coat On 9-Light Windoe Frame	13
	76W-14a	B-Roof East Side	Gray Air Vent Frame Caulk	14
	76W-14b	B-Roof East Side	Gray Air Vent Frame Caulk	14
	76W-15a	Roof A West Side	Roof Composite #3	15

OrderID: 032513165

APPENDIX V
PHOTO LOG

Worcester DPW
76 East Worcester Street
Worcester, Ma

Photo #1: Worcester DPW

Photo #2: Worcester DPW

Worcester DPW
76 East Worcester Street
Worcester, Ma

Photo #3 Sample #01A&B Brick Wall Expansion Caulk (Positive)

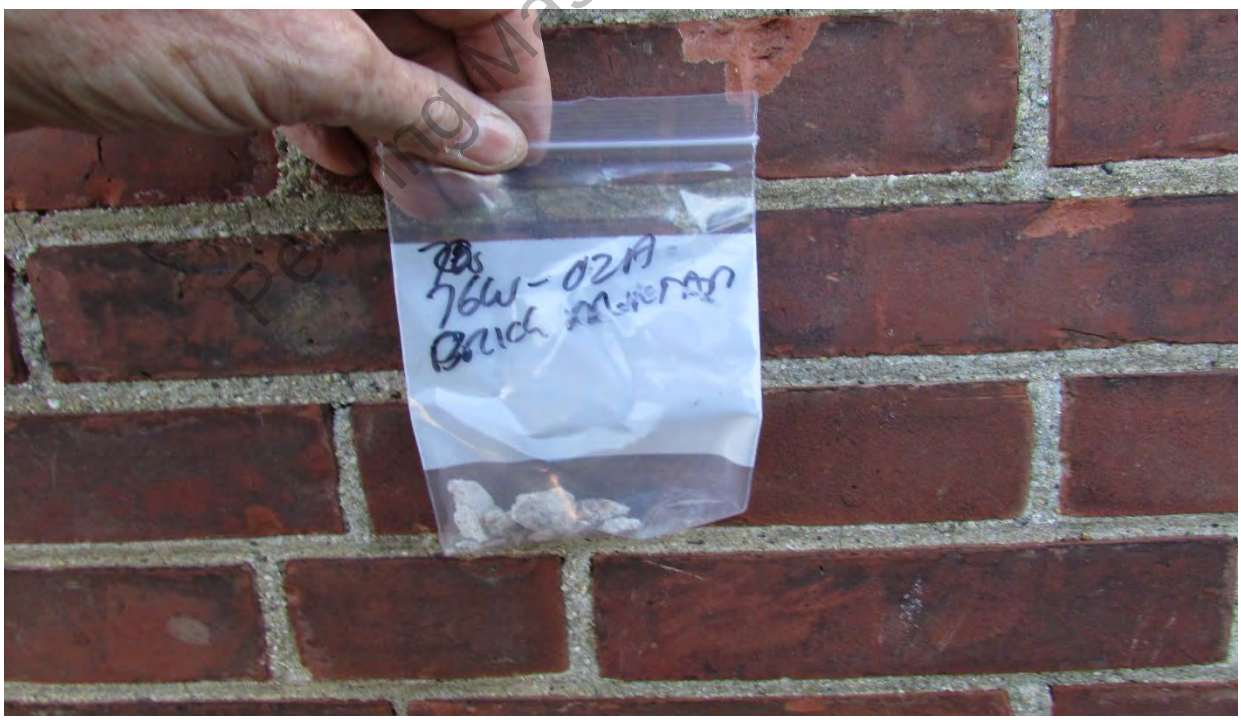


Photo #4 Sample 02A&B Brick Wall Mortar

Worcester DPW
76 East Worcester Street
Worcester, Ma

Photo #5 DPW Brick Wall (North Side)

Photo #6 Sample 03A&B Brick Wall

Worcester DPW
76 East Worcester Street
Worcester, Ma

Photo #7 Sample 04A Roof Composite #1 A-Roof

Photo #8 A-Roof

Worcester DPW
76 East Worcester Street
Worcester, Ma

Photo #09 A-Roof

Photo #10 A-Roof

Worcester DPW
76 East Worcester Street
Worcester, Ma

Photo #11 A-Roof Parapet Wall

Photo #12 Sample 05/06A&B White Flashing/Tar Under (Positive)

Worcester DPW
76 East Worcester Street
Worcester, Ma

Photo #13 A-Roof Material

Photo #14 Sample #07A&B Gray Sealant on Screw Caps (Parapet Wall) (Positive)

Worcester DPW
76 East Worcester Street
Worcester, Ma

Photo #15 Sample #09A&B Rubber Patch on Parapet Wall Seam

Photo #16 A-Roof

Worcester DPW
76 East Worcester Street
Worcester, Ma

Photo #17 Sample 10A&B Gray Patch Material on Exhaust Pipe (Positive)

Photo #18 Sample 11A&B Glazing on 9-Light Metal Window (B Roof) (Positive)

Worcester DPW
76 East Worcester Street
Worcester, Ma

Photo #18 Sample 11A&B

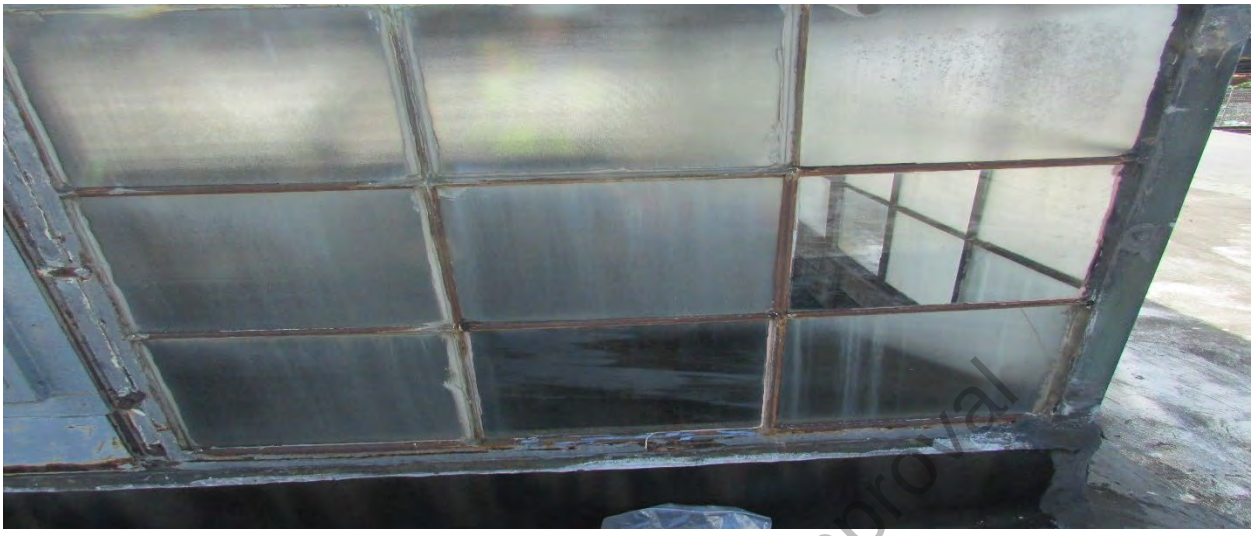


Photo #19 9-Light Metal Windows (B Roof)

Photo #20 B-Roof

Worcester DPW
76 East Worcester Street
Worcester, Ma

Photo #21 B-Roof

Photo #22 B-Roof

Worcester DPW
76 East Worcester Street
Worcester, Ma

Photo #23 Sample 13A-C Gray Coat on 9-Light Window Frame (Positive)

Photo #24 Sample #12A Roof Composite #3 B-Roof

Worcester DPW
76 East Worcester Street
Worcester, Ma

Photo #25 Compromized Roof Area

Worcester DPW
76 East Worcester Street
Worcester, Ma

Photo#26 A-Roof West

Photo #27 B-Roof West Side

Worcester DPW
76 East Worcester Street
Worcester, Ma

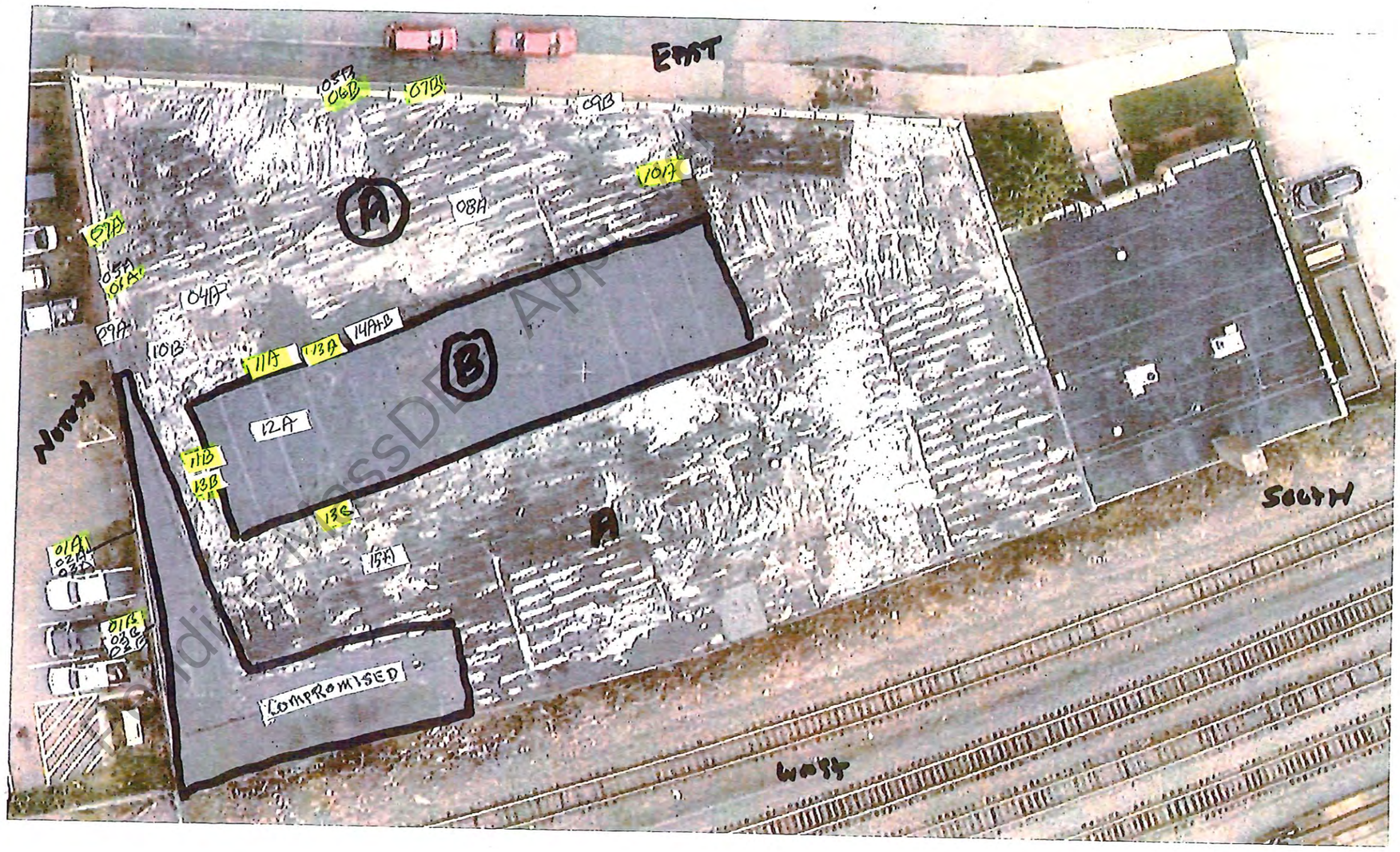
Photo #28 Sample 14A&B Vent Frame Caulk

APPENDIX VI
DRAWING

76 East Worcester St.
Worcester, MA
Job 183BW25194

O- Negative

O- Positive



SECTION 02 41 19

SELECTIVE DEMOLITION

I. PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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. Section Includes:

1. Demolition and removal of selected portions of building or structure.

B. Related Work Specified Elsewhere: The following items are not included in the Section, and will be performed under the designated Section:

1. Section 02 08 00 - Asbestos Abatement, for removal of asbestos-containing materials.

2. Section 07 50 01 - Membrane Roofing, for removal of the existing roof assembly and accessory components.

1.03 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse or store as directed.

C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.04 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.05 FIELD CONDITIONS

A. Owner will occupy portions of the building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: Present in portions of the existing wall and roof assemblies.

1. Hazardous material remediation is specified in Section 02 08 00 - Asbestos Abatement.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.06 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

II. PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Standards: Comply with ASSE A10.6 and NFPA 241.

III. PART 3 - EXECUTION

3.01 EXAMINATION

A. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.

1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.02 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

1. Maintain existing fire protection system.
2. Maintain existing fire alarm systems and exit signage.
3. Maintain existing electric service to work area. Contractors may utilize electric power for construction operations.
4. Temporarily disconnect and make-safe existing electrical devices impacted by scope of work.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building

3.03 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to Owner's vehicles.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.

2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 01 50 00 - Temporary Facilities and Controls.

B. Temporary Shoring: Refer to Structural Drawings for temporary shoring.

C. Remove temporary barricades and protections where hazards no longer exist.

3.04 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated on Drawings. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Maintain fire watch during and for as long after flame-cutting operations as required by the Worcester Fire Department.
2. Maintain adequate ventilation when using cutting torches.
3. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
4. Dispose of demolished items and materials promptly.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Removed and Reinstalled Items:

1. Reinstall disconnected electrical items on new construction in the same or similar position they were prior to construction. Provide connections, supports, and miscellaneous materials necessary to make item functional for use.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition.

3.05 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts. Using hand tools, tooth masonry that remains to receive new matching masonry.

B. Structural Steel: Steel members that remain following selective demolition shall be inspected for damage and deterioration. Inspect connections to building structure. Make minor repairs and replace fasteners at no additional cost. Notify Architect if extensive repair or replacement is recommended that will involve additional cost.

C. Electrical Items: Temporarily disconnect and make-safe electrical items mounted to steel beams scheduled to be replaced. Disconnect and cap service at junction box nearest to work area or where indicated. Electrical work to be performed by a licensed electrician.

3.06 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris

to grade level in a controlled descent.

3.07 CLEANING

A. General: Clean adjacent existing construction of dust, dirt, and debris caused by selective demolition operations.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

I PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mix design, placement procedures, and finishes.

1.03 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.

1.04 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.

C. Steel Reinforcement Shop Drawings: Details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement." Include material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports of concrete reinforcement. Include special reinforcement required for openings through concrete structures.

D. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork. Design and engineering of formwork are Contractor's responsibility.

1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and installing and removing reshoring.

E. Welding Certificates: Copies of certificates for welding procedures and personnel.

G. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:

H. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:

1. Cementitious materials and aggregates.
2. Form materials and form-release agents.
3. Steel reinforcement and reinforcement accessories.
4. Fiber reinforcement.
5. Admixtures.

6. Curing materials.
7. Floor and slab treatments.
8. Bonding agents.
9. Adhesives.
10. Vapor retarders.
11. Epoxy joint filler.
12. Joint-filler strips.
13. Repair materials.

I. Minutes of preinstallation conference.

1.05 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."

1.06 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.

II PART 2 PRODUCTS

2.01 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
   (a.) High-density overlay, Class 1, or better.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. 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.

D. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.

E. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.

F. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

G. 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.

H. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of the exposed concrete surface.
2. Furnish ties that, when removed, will leave holes not larger than 1 inch in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive damp proofing or waterproofing.

2.02 STEEL REINFORCEMENT

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

B. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

2.03 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected or CRSI Class 2 stainless-steel bar supports.

B. Joint Dowel Bars: Plain-steel bars, ASTM A 615/A 615M, Grade 60. Cut bars true to length with ends square and free of burrs.

2.04 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 unless otherwise noted in concrete mixes.
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.

2.05 ADMIXTURES

A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material and to be compatible with other admixtures and cementitious materials. Do not use admixtures containing calcium chloride.

B. Air-Entraining Admixture: ASTM C 260.

C. Water-Reducing Admixture: ASTM C 494, Type A.

2.06 VAPOR RETARDERS

A. Vapor Retarder: ASTM E 1745, Class C, of one of the following materials; or polyethylene sheet, ASTM D 4397, not less than 10 mils thick:

1. Nonwoven, polyester-reinforced, polyethylene coated sheet; 10 mils thick.
2. Three-plu, nylon- or polyester-cold-reinforced, laminated, high-density polyethylene sheet; 7.8 mils thick.

2.07 CURING MATERIALS

A. Water: Potable.

2.08 RELATED MATERIALS

A. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

B. Epoxy Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Shore A hardness of 80 per ASTM D 2240.

C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

D. Epoxy-Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:

1. Type II, non-load bearing, for bonding freshly mixed concrete to hardened concrete.
2. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
3. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

E. Reglets: Fabricate reglets of not less than 0.0217-inch- thick galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

F. Dovetail Anchor Slots: Hot-dip galvanized steel sheet, not less than 0.0336 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.09 CONCRETE MIXES

A. Prepare design mixes for each type and strength of concrete determined by either laboratory trial mix or field test data bases, as follows:

1. Proportion normal-weight concrete according to ACI 211.1 and ACI 301.

B. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the laboratory trial mix basis.

C. Slab-on-Grade: Proportion normal-weight concrete mix as follows:

1. Compressive Strength (28 Days): 4000 psi.
2. Maximum Slump: 5 inches.

D. Cementitious Materials: For concrete exposed to deicers, limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements.

E. Maximum Water-Cementitious Materials Ratio: 0.45 for concrete exposed to deicers or subject to freezing and thawing while moist.

F. Air Content: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content of 2 to 4 percent, unless otherwise indicated.

G. Air Content: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows within a tolerance of plus 1 or minus 1.5 percent, unless otherwise indicated:

1. Air Content: 6 percent for 3/4-inch- nominal maximum aggregate size.

H. Do not air entrain concrete to trowel-finished interior floors and suspended slabs. Do not allow entrapped air content to exceed 3 percent.

I. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

J. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

2.10 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.11 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.

III PART 3 EXECUTION

3.01 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.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.

1. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete. Coordinate chamfer locations with architectural drawings.

J. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

K. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

L. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

M. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.02 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.

3.03 REMOVING AND REUSING FORMS

A. General: Formwork, for sides of beams, walls, columns, and similar parts of the Work, that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete provided concrete is hard enough to not be damaged by form-removal operations and provided curing and protection operations are maintained.

B. Leave formwork, for beam soffits, joists, slabs, and other structural elements, that supports weight of concrete in place until concrete has achieved the following:

1. 28-day design compressive strength.
2. At least 70 percent of 28-day design compressive strength.
3. Determine compressive strength of in-place concrete by testing representative field- or laboratory-cured test specimens according to ACI 301.
4. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

C. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

D. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.04 SHORES AND RESHORES

A. Comply with ACI 318, ACI 301, and recommendations in ACI 347R for design, installation, and removal of shoring and reshoring.

B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.

C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.05 VAPOR RETARDERS

A. Vapor Retarder: Place, protect, and repair vapor-retarder sheets according to ASTM E 1643 and manufacturer's written instructions.

3.06 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.

3.07 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness, as follows:

1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
2. Division 7 Section "Joint Sealants," are indicated.

3.08 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.

3.09 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 exposed to public view or 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. 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.

3.10 FINISHING FLOORS AND 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. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes.

1. Apply scratch finish to surfaces indicated and to surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, portland cement terrazzo, and other bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system.
2. Finish surfaces to the following tolerances, measured within 24 hours according to ASTM E 1155/E 1155M for a randomly trafficked floor surface:
   (a.) Specified overall values of flatness, F(F) 25; and levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and levelness, F(L) 15.

3. Finish and measure surface so gap at any point between concrete surface and an unleveled freestanding 10-foot- long straightedge, resting on two high spots and placed anywhere on the surface, does not exceed the following:
   (a.) 1/4 inch.

E. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.

F. Broom Finish: 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.

G. Slip-Resistive Aggregate Finish: Before final floating, apply slip-resistive aggregate finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:

1. Uniformly spread 25 lb/100 sq. ft. of dampened slip-resistive aggregate over surface in one or two applications. Tamp aggregate flush with surface, but do not force below surface.
2. After broadcasting and tamping, apply float finish.
3. After curing, lightly work surface with a steel wire brush or an abrasive stone, and water to expose slip-resistive aggregate.

3.11 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.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.

3.12 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.

3.13 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least six months. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid epoxy joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.14 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.

3.15 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mix exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
6. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of four standard cylinder specimens for each composite sample.
   (a.) Cast and field cure one set of four standard cylinder specimens for each composite sample.
7. Compressive-Strength Tests: ASTM C 39; test two laboratory-cured specimens at 7 days and two at 28 days.
   (a.) Test two field-cured specimens at 7 days and two at 28 days.

(b.) A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at age indicated.

C. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.

D. Strength of each concrete mix will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

E. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-and 28-day tests.

F. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

G. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.

END OF SECTION

SECTION 04 20 01

UNIT MASONRY
(FILED SUB BID)

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 FILED SUB-BIDS

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c.149 §§44A-J. The time and place for submission of sub-bids are set forth in the Advertisement. The procedures and requirements for submitting sub-bids are set forth in the Instructions to Bidders.

B. Sub-bidders must be DCAMM Certified in the listed trade and shall include a Current DCAMM sub-bidder Certificate of Eligibility and a signed DCAMM Sub-bidder's Update Statement with the bid.

1. Masonry Work

C. The Work of this Section is shown on Drawings:

1. A2, S0.1, S1.1, S1.2

1.03 SCOPE 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. Replacement and repair of existing CMU/brick backup wall.
2. Repointing and replacing existing face brick.
3. Coordination with the General Contractor for use of staging, planking and scaffolding, interior and exterior, which is the responsibility of the General Contractor as specified in Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

B. **Alternates:**

1. None

C. **Items to Be Installed Only:** Install the following items as furnished by the designated Sections:

1. 05 12 00 - Structural Steel Framing, for structural beam bearing plates.

D. **Items to Be Furnished Only:** Furnish the following items for installation by the designated Sections:

1. Dur-o-Wall Clips to be shop welded to structural steel under Section 05 12 00.

(a.) Include Shop drawing layout to the structural steel fabricator where Dur-o-Wall clips are indicated to be shop welded to the steel framing members.

E. **Related Work Specified Elsewhere:** The following items are not included in the Section, and will be performed under the designated Section:

1. 02 41 19 - Selective Demolition, for shoring and demolition of masonry.
2. 05 12 00 - Structural Steel Framing, for replacement of existing structural members in CMU.

1.04 REFERENCES

A. ANSI A41.2 - Building Code Requirements for Reinforced Masonry.

B. ASTM C144 – Standard Specification for Aggregate for Masonry Mortar

C. ASTM C270 – Standard Specification for Mortar for Unit Masonry (for reference; project mortar shall be designed, not selected from property tables)

D. ASTM E2260 – Standard Guide for Repointing (Tuckpointing) Historic Masonry

E. International Masonry Industry All-Weather Council (IMIAC) - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.05 SUBMITTALS

A. Make submittals under provisions of Section 01 33 00.

B. Submit proposed schedules to coordinate with owner's continuing occupation of portions of existing building and access to area adjacent to train tracks.

C. Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement."

D. Samples for Verification: For each type and color of the following:

1. Pigmented mortar. Make Samples using same sand and mortar ingredients to be used on Project. Label Samples to indicate types and amounts of pigments used.
2. Weep holes/vents.
3. Accessories embedded in masonry.

E. Qualification Data:

1. Material Certificates: Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards. Provide for each type and size of the following:
2. Masonry units:
   (a.) Include material test reports substantiating compliance with requirements.
   (b.) For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
3. Cementitious materials. Include brand, type, and name of manufacturer.
4. Mortar mixes. Include description of type and proportions of ingredients.
5. Grout mixes. Include description of type and proportions of ingredients.
6. Reinforcing bars.
7. Joint reinforcement.
8. Anchors, ties, and metal accessories.
9. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
   (a.) Include test reports, per ASTM C 780 for mortar mixes required to comply with property specification.
   (b.) Include test reports, per ASTM C 1019 for grout mixes required to comply with compressive strength requirement.
10. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to

comply with cold-weather requirements.

1.06 QUALITY ASSURANCE

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from one source or producer for each aggregate.

C. Sample Panels: not required.

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01. Agenda shall include protection of air barrier membrane during construction.

E. Testing Agency Qualifications: Qualified according to ASTM C1093 for testing indicated.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.08 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above

and will remain so until masonry has dried, but not less than 7 days after completing cleaning.

D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

II PART 2 PRODUCTS

2.01 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to exceed tolerances and to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects, including dimensions that vary from specified dimensions by more than stated tolerances, will be exposed in the completed Work or will impair the quality of completed masonry.

2.02 CONCRETE MASONRY UNITS (CMUs)

A. Concrete Masonry Units: ASTM C 90, normal weight unless indicated otherwise manufactured to dimensions 3/8 inch less than nominal dimensions.

B. Shapes: Provide standard shapes indicated and as required for building configuration. Provide special shapes for corners, movement joints, and other special conditions.

C. Integral Water Repellent: Not required.

2.03 BRICK UNITS

A. Manufacturers: Modular unit brick products by Acme Brick Company, Belden Brick Company, Summit Brick Company or approved equal meeting the properties specified herein.

B. Standard face brick shall be FBS and shall be as follows:

1. Modular in size, dimensions to match existing brick.
   (a.) 2-1/4" x 3-5/8" x 7-5/8" presumed existing brick dimension. G.C. to verify in field.
2. Conform to requirements of ASTM C216.
3. Grade: SW.
4. New Brick to match existing as closely as possible in variation, texture and overall appearance.

C. Existing undamaged brick may be used provided that new brick and existing brick shall be evenly distributed resulting in a uniform appearance and approved by the owner.

2.04 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortar.

1. Available Products:
   (a.) LanXess; Bayferrox Iron Oxide Pigments.
   (b.) Davis Colors; True Tone Mortar Colors.
   (c.) Solomon Grind-Chem Services, Inc.; SGS Mortar Colors.

D. Aggregate for Mortar: ASTM C 144. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.

E. Aggregate for Grout: ASTM C 404.

F. Water-Repellent Admixture: Not required.

G. Water: Potable.

2.05 REINFORCEMENT

A. Uncoated (Billet) Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.

B. Masonry Joint Reinforcement: HB 230 Ladder-Tri-Mesh

1. ASTM A951.
2. Wire Material: Type 304 Stainless Steel meeting ASTM A580.
3. Wire Diameter: 9 gauge
4. Wire Size: (S) Standard Weight
5. Block size: Verify in field.
6. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

2.06 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Limit cementitious materials in mortar to portland cement, and lime.

B. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.

1. For reinforced masonry, use Type S.
2. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.

C. Pigmented Mortar: Use colored cement product. Pigments shall not exceed 10 percent of portland cement by weight.

D. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
2. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

2.07 EXPANSION JOINT

A. Backer Rod: 3/4" Closed cell backer rod meeting the following properties:

1. Chemical Base: Closed cell polyethylene foam.
2. Packaging: 3/4" diameter by 20ft per bag.
3. Color: Light Gray.
4. Density: 2.0 lbs/ ft^3, per ASTM D1622.
5. Tensile Strength: 50 psi, per ASTM D1623
6. Service Temperature: -90°F to 210°F
7. Water Absorption: 0.03 gm/cc, per ASTM C1016

B. Sealant: Premium-grade, high-performance, moisture-cured, 1-component, polyurethane-based, non-sag elastomeric sealant meeting the following properties (basis of design: Sikaflex 1A):

1. Non-staining.
2. Color: To match face brick mortar joint.
3. Testing: (21 day) 45±5, per ASTM C 661.
4. Elongation at Break: 550 %, per ASTM D-412.
5. Tear Strength: 55 lb./in., per ASTM D-624.
6. Movement Capability: ±35 %, per ASTM C-719.
7. Service Temperature: −40 °F to +170 °F.
8. Weather Resistance: Excellent.
9. Approvals/Standards:
   (a.) Certified to NSF/ANSI/CAN 61 for potable water.
   (b.) ASTM C920, Type S, Grade NS, Class 35, Use T, NT, O, M, A, I.
   (c.) SWRI validated acc. to ASTM C719 (No. 0123-S0128).
   (d.) Federal specification TT-S-00230 C Type II, Class A.

2.08 ACCESSORIES

A. Compressible Filler: Premolded, flexible cellular neoprene rubber filler strips complying with ASTM D 1056, Grade RE41E1, capable of compression up to 35% of width and thickness indicated.

B. Sealant: Neutral curing silicone sealant. Available manufacturers:

1. Dowsil; 790.
2. GE Silicones; SilPruf LM SCS2700.
3. Sikasil: WS-290.

2.09 MASONRY CLEANERS

A. Cleaner to be selected for suitability with all masonry materials incorporated into building envelope.

B. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Available Manufacturers:
   (a.) Diedrich Technologies, Inc.
   (b.) EaCo Chem, Inc.
   (c.) ProSoCo, Inc.

C. Proprietary Non-Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Available Product: EaCo Chem, Inc.; SOS 50.

III PART 3 EXECUTION

3.01 COORDINATION AND EXAMINATION

A. Review the existing conditions and the scope of demolition with the trade responsible for demolishing existing masonry walls, prior to the start of that work. Identify elements or portions of the walls to remain or to be protected during demolition.

1. Tooth out any broken or cracked blocks along construction joints so that full new masonry units can be installed to align with existing courses.

B. Coordinate the sizes of built-in items with block coursing, and advise Architect of any recommended changes to suit field conditions, before proceeding.

C. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Start of installation constitutes acceptance of existing conditions.

3.02 INSTALLATION, GENERAL

A. Thickness: Build double-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed. Do not use units cut to less than one-half size.

D. Do not install concrete masonry units with more than 5 percent damage to the face. Do not install brick units which will show defects after installation.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

F. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:

1. For conspicuous vertical lines, such as external corners and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
2. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
3. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
4. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
5. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
6. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

3.03 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs. Prior to installation review bond pattern with Designer and the Owner.

C. Stopping and Resuming Work: When practical, stop work by raking back units in each course from those in course below; toothing is acceptable if necessary for the progress of the work. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

E. Fill space between steel frames and masonry solidly with mortar, unless otherwise indicated.

F. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

3.04 MORTAR BEDDING AND JOINTING

A. Lay hollow concrete masonry units as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated, except as follows:

3.05 CMU JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches. Space reinforcement not more than 16 inches o.c.

B. Interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

3.06 REINFORCED UNIT MASONRY INSTALLATION

A. Refer to structural Drawings for size and extent of reinforcing and grouting of cells in CMU walls.

B. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.

2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

C. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602. Install rebar where indicated on drawings. Grout reinforced cells fully.

D. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

3.07 FACE BRICK INSTALLATION

A. Lay face brick plumb, level, true to line, and with uniform joints to match existing.

B. Maintain alignment of coursing with adjacent existing masonry.

C. Lay brick with full mortar coverage on horizontal and vertical surfaces.

D. Butter ends of brick sufficiently to provide full head joints. Do not furrow mortar or use methods that result in voids in bed joints.

E. Do not use brick with chips, cracks, broken corners, excessive staining, or other defects in exposed locations.

F. Match existing masonry coursing, bond, color, texture, and joint profile where replacement masonry is intended to blend with existing construction.

G. Tool mortar joints when mortar is thumbprint hard.

1. Tool joints to produce a dense, smooth, compacted surface.
2. Match existing joint profile where applicable.
3. Do not rake or tool joints after mortar has become too hard to compact.

3.08 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, around penetrations and where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Designer's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.09 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off the Site.

END OF SECTION

SECTION 05 12 00

STRUCTURAL STEEL FRAMING

I PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes structural steel.

B. Products installed, but not furnished under this Section include the following:

1. Dur-o-wall ties that are shop welded to structural steel beams and columns, furnished under Division 04 20 01 - Unit Masonry. Locations, quantities, and spacing to be provided by the mason.

C. Products furnished, but not installed under this Section include the following:

1. Section 04 20 01 – Unit Masonry for bearing plates for structural steel beams bearing on CMU walls.

D. Related Sections: The following Sections contain requirements that relate to this Section:

1. Section 04 2000 – Unit Masonry.
2. Section 05 3100 – Steel Decking.
3. Section 05 5000 – Metal Fabrications.
4. Section 09 90 01 – Painting.

1.03 PERFORMANCE REQUIREMENTS

A. Structural Performance: Engineer structural steel connections if altered from the Contract Documents to be completed by the fabricator to withstand design loadings indicated. Any changes to the Contract Document connections must be approved by the Structural Engineer of Record.

B. Engineering Responsibility: Engage a fabricator who utilizes a qualified professional engineer to prepare calculations, Shop Drawings, and other structural data for structural steel connections, altered from the Contract Documents.

1.04 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each type of product specified.

C. Shop Drawings detailing fabrication of structural steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
3. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify high-strength bolted slip-critical, direct-tension, or tensioned shear/bearing connections.
4. Include Shop Drawings signed and sealed by a qualified professional engineer responsible for their

preparation.

D. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

E. Mill test reports signed by manufacturers certifying that their products, including the following, comply with requirements.

1. Structural steel, including chemical and physical properties.
2. Bolts, nuts, and washers, including mechanical properties and chemical analysis.
3. Direct-tension indicators.
4. Shop primers.
5. Non-shrink grout.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed structural steel work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Fabricator Qualifications: Engage a firm experienced in fabricating structural steel similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to fabricate structural steel without delaying the Work.

1. Fabricator must participate in the AISC Quality Certification Program and be designated an AISC-Certified Plant as follows:
   (a.) Category: Category I, conventional steel structures.

C. Comply with applicable provisions of the following specifications and documents:

1. AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
2. AISC's "Load and Resistance Factor Design (LFRD) Specification for Structural Steel Buildings."
3. AISC's "Specification for Allowable Stress Design of Single-Angle Members."
4. AISC's "Specification for Load and Resistance Factor Design of Single-Angle Members."
5. AISC's "Seismic Provisions for Structural Steel Buildings."
6. ASTM A 6 (ASTM A 6M) "Specification for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use."
7. Research Council on Structural Connections' (RCSC) "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
8. Research Council on Structural Connections' (RCSC) "Load and Resistance Factor Design Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the 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 projects with structural steel framing that are similar to that indicated for this Project in material, design, and extent.

E. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code—Steel."

1. Present evidence that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver structural steel to Project site in such quantities and at such times to ensure continuity of

installation.

B. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration.

1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
2. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.07 SEQUENCING

A. Supply anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

II PART 2 PRODUCTS

2.01 MATERIALS

A. Structural Steel Shapes, Plates, and Bars: As follows:

1. Carbon Steel: ASTM A 36 for plates, angles, and channels.
2. High-Strength, Low-Alloy Columbium-Vanadium Steel: ASTM A 992 Grade 50 for all wide flange sections.

B. Cold-Formed Structural Steel Tubing: ASTM A 500, Grade B.

C. Hot-Formed Structural Steel Tubing: ASTM A 501.

D. Steel Pipe: ASTM A 53, Type E or S, Grade B.

1. Weight Class: Standard. (as noted)
2. Weight Class: Extra strong. (as noted)
3. Weight Class: Double-extra strong. (as noted)
4. Finish: Black

E. Anchor Rods, Bolts, Nuts, and Washers: As follows:

1. Headed Bolts: ASTM A 36 threaded rods and ASTM A 307 anchor (see structural drawings).
2. Nuts: ASTM A563 heavy-hex carbon steel.
3. Washers: ASTM A 36, Type 1, hardened carbon steel.
4. Plate Washers: ASTM A36 carbon steel.

F. High-Strength Bolts, Nuts, and Washers: ASTM A 325 Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers, and ASTM A 490 Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers.

1. Finish: Plain, uncoated.
2. Direct-Tension Indicators: ASTM F 959, Type 325 and Type 490.
   (a.) Finish: Plain, uncoated.
3. Tension control bolts: ASTM A325 and A490.
   (a.) Finish: Plain, uncoated.

G. Welding Electrodes: Comply with AWS requirements.

2.02 PRIMER

A. Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer with good resistance to normal atmospheric corrosion, complying with performance requirements of FS TT-P-664. Color to be gray.

2.03 HOT-DIPPED GALVANIZING

A. Hot-Dipped Galvanizing: Provide coating for iron and steel fabrications applied by the hot-dip process. Comply with ASTM A 123 for fabricated products and ASTM A 153 for hardware. Provide thickness of galvanizing specified in reference standard. The galvanizing bath shall contain high grade zinc, nickel, and other earthly materials.

2.04 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, of consistency suitable for application, and a 30-minute working time.

2.05 FABRICATION

A. Fabricate and assemble structural steel in shop to greatest extent possible. Fabricate structural steel according to AISC specifications referenced in this Section and in Shop Drawings.

1. Camber structural steel members where indicated.
2. Identify high-strength structural steel according to ASTM A 6 and maintain markings until steel has been erected.
3. Mark and match-mark materials for field assembly.
4. Fabricate for delivery a sequence that will expedite erection and minimize field handling of structural steel.
5. Complete structural steel assemblies, including welding of units, before starting shop-priming operations.
6. Comply with fabrication tolerance limits of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel.

B. Fabricate architecturally exposed structural steel with exposed surfaces smooth, square, and free of surface blemishes, including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness.

1. Remove blemishes by filling, grinding, or by welding and grinding, prior to cleaning, treating, and shop priming.
2. Comply with fabrication requirements, including tolerance limits, of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for architecturally exposed structural steel.

C. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded.

D. Finishing: Accurately mill ends of columns and other members transmitting loads in bearing.

E. Holes: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on Shop Drawings.

1. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.
2. Weld threaded nuts to framing and other specialty items as indicated to receive other work.

2.06 SHOP CONNECTIONS

A. Shop install and tighten nonhigh-strength bolts, except where high-strength bolts are indicated.

B. Shop install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1. Bolts: ASTM A 325 high-strength bolts, unless otherwise indicated
2. Connection Type: Slip-critical unless otherwise noted

C. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that shall maintain true alignment of axes without warp.
2. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel shall limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds 1/2 inch and larger. Grind flush butt welds. Dress exposed welds.

2.07 SHOP PRIMING

A. Shop prime steel surfaces, except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of inches.
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed-on fireproofing.
5. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Prepare surfaces according to SSPC specifications as follows:

1. SSPC-SP 2 "Hand Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply 2 coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.

D. Painting: Apply a 1-coat, nonasphaltic primer complying with SSPC's "Painting System Guide No. 7.00" to provide a dry film thickness of not less than 1.5 mils.

2.08 SOURCE QUALITY CONTROL

A. Owner will engage an independent testing and inspecting agency to perform shop inspections and tests and to prepare test reports.

1. Testing agency will conduct and interpret tests and state in each report whether test specimens comply with or deviate from requirements.
2. Provide testing agency with access to places where structural steel Work is being fabricated or produced so required inspection and testing can be accomplished.

B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.

C. Additional testing, at Contractor's expense, shall be performed to determine compliance of corrected Work with specified requirements.

D. Shop-bolted connections shall be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

E. In addition to visual inspection, shop-welded connections shall be inspected and tested according to AWS D1.1 and the inspection procedures listed below, at testing agency's option.

1. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
2. 25% of all welded connections shall be visually inspected.

III PART 3 EXECUTION

3.01 EXAMINATION

A. Before erection proceeds, and with the steel erector present, verify elevations of concrete and masonry bearing surfaces and locations of anchorages for compliance with requirements.

B. Do not proceed with erection until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.03 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section.

B. Base and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.

1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
3. Pack grout solidly between bearing surfaces and plates so no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.
   (a.) Comply with manufacturer's instructions for proprietary grout materials.

C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

1. Maintain erection tolerances of architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members forming part of complete frame or structure before

permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.

E. Splice members only where indicated.

F. Remove erection bolts on welded, architecturally exposed structural steel; fill holes with plug welds; and grind smooth at exposed surfaces.

G. Do not use thermal cutting during erection.

H. Finish sections thermally cut during erection equal to a sheared appearance.

I. Do not enlarge holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts.

3.04 FIELD CONNECTIONS

A. Install and tighten nonhigh-strength bolts, except where high-strength bolts are indicated.

B. Install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Install and tighten high-strength bolts according to RCSC's "Load and Resistance Factor Design Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1. Bolts: ASTM A 325 high-strength bolts and ASTM A 490 high-strength bolts as indicate
2. Connection Type: Slip-critical unless otherwise noted

D. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.

1. Comply with AISC specifications referenced in this Section for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
2. Assemble and weld built-up sections by methods that shall maintain true alignment of axes without warp.
3. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel shall limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds 1/2 inch and larger. Grind flush butt welds. Dress exposed welds.

3.05 FIELD QUALITY CONTROL

A. Owner will engage an independent testing and inspecting agency to perform field inspections and tests and to prepare test reports.

1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from requirements.

B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.

C. Additional testing, at Contractor's expense, shall be performed to determine compliance of

corrected Work with specified requirements.

D. Field-bolted connections shall be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

E. In addition to visual inspection, field-welded connections shall be inspected and tested according to AWS D1.1 and the inspection procedures listed below, at testing agency's option.

1. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.

3.06 CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.

1. Apply by brush or spray to provide a minimum dry film thickness of 1.5 mils.

END OF SECTION

SECTION 05 31 00

STEEL DECKING

I PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:

1. Roof deck.

B. Related Sections include the following:

1. Section 05 12 00 – Structural Steel Framing.
2. Section 05 50 00 – Metal Fabrications.
3. Section 09 90 01 – Painting.

1.03 SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, deck openings, special jointing, accessories, and attachments to other construction.

C. Product Certificates: Signed by steel deck manufacturers certifying that products furnished comply with requirements.

D. Welding Certificates: Copies of certificates for welding procedures and personnel.

E. Product Test Reports: From a qualified testing agency indicating that each of the following complies with requirements, based on comprehensive testing of current products:

1. Mechanical fasteners.

F. Research/Evaluation Reports: Evidence of steel deck's compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed steel deck 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. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code—Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

D. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those steel deck units tested for fire resistance per ASTM E 119 by a testing and inspection agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.

E. AISI Specifications: Calculate structural characteristics of steel deck according to AISI's "Specification for the Design of Cold-Formed Steel Structural Members."

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

II PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Steel Deck:
   (a.) BHP Steel Building Products USA Inc.
   (b.) Consolidated Systems, Inc.
   (c.) Epic Metals Corp.
   (d.) Marlyn Steel Products, Inc.
   (e.) Nucor Corp.; Vulcraft Div.
   (f.) Roof Deck, Inc.
   (g.) United Steel Deck, Inc.
   (h.) Verco Manufacturing Co.
   (i.) Wheeling Corrugating Co.; Div. of Wheeling-Pittsburgh Steel Corp.

2.02 ROOF DECK

A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 29, and the following:

1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 (230), G60 (Z180) zinc coating.
2. Deck Profile: Type B, wide rib.
3. Profile Depth: 1-1/2 inches (38 mm).
4. Design Uncoated-Steel Thickness: 16GA.
5. Span Condition: As indicated.
6. Side Laps: Overlapped or interlocking seam at Contractor's option.

2.03 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 (4.8 mm) minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0359-inch (0.91-mm) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Steel Sheet Accessories: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.

G. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 29 for overhang and slab depth.

H. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.

I. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.

J. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0747 inch (1.90 mm)] thick, with factory-punched hole of 3/8-inch (9.5-mm) minimum diameter.

K. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck, with 3-inch- (76-mm-) wide flanges and [level] [sloped] recessed pans of 1-1/2- inch (38-mm) minimum depth. For drains, cut holes in the field.

L. Flat Sump Plate: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck. For drains, cut holes in the field.

M. Shear Connectors: ASTM A 108, Grades 1010 through 1020 headed stud type, cold-finished carbon steel, AWS D1.1, Type B with arc shields.

N. Galvanizing Repair Paint: ASTM A 780.

III PART 3 EXECUTION

3.01 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

3.02 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 29, manufacturer's written instructions, and requirements in this Section.

B. Install temporary shoring before placing deck panels, if required to meet deflection limitations.

C. Locate decking bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

1. Align cellular deck panels for entire length of cell runs and align cells at ends of abutting panels.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to decking.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of decking, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.03 ROOF DECK INSTALLATION

A. Fasten roof deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter, but not less than 1-1/2 inches (38 mm) long, and as follows:

1. Weld Diameter: 5/8 inch (16 mm), nominal.
2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of four welds per deck unit at each support. Space welds 12 inches (305 mm) apart.
3. Weld Washers: Install weld washers at each weld location.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of 1/2 of the span or 12 inches (450 mm), and as follows:

1. Mechanically fasten with self-drilling No. 10 (4.8-mm-) diameter or larger carbon-steel screws.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:

1. End Joints: Lapped 2 inches (51 mm) minimum.

D. Roof Sump Pans and Sump Plates: Install over openings provided in roof decking and weld flanges to top of deck. Space welds not more than 12 inches (305 mm) apart with at least 1 weld at each corner.

E. Miscellaneous Roof Deck Accessories: Install ridge and valley plates, finish strips, cover plates, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld to substrate to provide a complete deck installation.

F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

3.04 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing agency to perform field quality-control testing.

B. Field welds shall be subject to inspection.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Remove and replace work that does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, shall be performed to determine compliance of corrected work with specified requirements.

3.05 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 06 10 00

ROUGH CARPENTRY

I. PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

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. 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. Products to be used in conjunction with installation of the new window buck, including:
   (a) Dimensional wood blocking.
   (b) Plywood padding and blocking.

2. Nails, bolts and fasteners for securing items of this section.
3. Brakemetal trim associated with the clerestory windows.
4. Self-adhered ice and water shield.

B. **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.

C. **Items to Be Furnished Only:** Furnish the following items for installation by the designated Sections:

1. None.

D. **Related Work Specified Elsewhere:** The following items are not included in this Section, and will be performed under the designated Section:

1. 07 50 01 - Membrane Roofing, for roof edge curbs and blocking.
2. 08 45 23 - Insulated Translucent Panel Wall System, for installation of new glazing panels on new window buck.
3. 09 90 00 - Painting, for painting of interior exposed wood elements.

1.03 REFERENCES

A. APA: American Plywood Association.

B. AWPA (American Wood Preservers Association) C1 - All Timber Products Preservative Treatment by Pressure Process.

C. NFPA: National Forest Products Association.

1.04 SUBMITTALS

A. Product Data:

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. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Samples: not required.

C. Shop Drawings: not required.

D. Schedule: not required.

E. Qualification Data: not required.

F. Product Test Reports: 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.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with the following agencies:

1. Lumber Grading Agency: Certified by ALSC.
2. Plywood Grading Agency: Certified by APA.

B. The maximum moisture content for lumber products shall be 19 percent on air-dried stock, and 15 percent maximum on kiln-dried (KD) stock. All lumber stock shall be furnished air-dried unless specifically noted otherwise.

C. Except when particular types of dressing are specified for certain products, surface lumber four sides (S4S).

1.06 DELIVERY, STORAGE AND HANDLING

A. Keep materials dry during delivery and storage. Store all materials indoors, within the project area. No outdoor storage will be permitted.

B. Stack lumber and plywood, and provide air circulation within stacks. Do not store or erect material in wet or damp portions of the building or in areas where plastering or similar work is to be executed until such work has been completed and has become reasonably dry.

1.07 PROJECT CONDITIONS

A. Installer must examine the substrate and supporting structure and the conditions under which the carpentry work is to be installed, and notify the Contractor in writing of conditions detrimental to the Work. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

B. Coordination: Fit carpentry work to other work; scribe and cope as required for accurate fit. Coordinate location of furring, nailers, blocking, grounds and similar supports to allow proper attachment of other Work.

1.08 WARRANTY

A. Contractor’s standard 1-year warranty on installed items.

B. Manufacturer's standard warranty on treated lumber.

II. PART 2 - 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 Panels:

1. Plywood: Either DOC PS 1 or DOC PS 2, unless otherwise indicated.
2. Thickness: As needed to comply with requirements specified but not less than thickness indicated.
3. Factory mark panels according to indicated standard.

2.02 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA T1-11.

B. Preservative: Alkaline Copper Quat Type A (P5).

C. Kiln-dry material after treatment to a maximum moisture content of 19 percent for lumber and 18 percent for plywood. Do not use material that is warped or does not comply with requirements for untreated material.

D. Mark each treated item with the treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.

E. Application: Treat items indicated on Drawings, and the following:

1. Members in connection with roofing, flashing, vapor barriers, and waterproofing shall be treated in accordance with AWPA Standard U1-11to the requirements of Use Category 3A (UC3A).

2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete in exterior walls, AWPA Standard U1-11to the requirements of Use Category 2 (UC2).

2.03 LUMBER

A. General: Provide lumber for support or attachment of other construction, including the following:

1. Blocking.

B. For concealed items of dimensional lumber size, provide Stress-Graded (Dimension) lumber, meeting Construction, Stud, or No. 2 grade with 15 percent moisture content.

C. All blocking lumber shall be pressure treated.

2.04 PLYWOOD SHEATHING

A. Plywood used for shimming blocking to match the thickness of the new insulation, shall be pressure treaded,

and shall be installed in continuous strips for the length of the blocking. Any plywood used shall be installed below or between blocking, and not on top of the blocking.

2.05 ICE AND WATER SHIELD

A. Self-adhered roofing underlayment composed of rubberized asphalt adhesive and high density cross laminated polyethylene film. Basis of Design is "Vycor" by Certainteed. Equal products by other manufacturers are acceptable meeting the performance requirements specified herein:

1. Color: Gray-black
2. Thickness: 40 mil, per ASTM D3767 method A
3. Tensile Strength, membrane: 250 psi, per ASTM D412
4. Elongation, membrane: 250%, per ASTM D412
5. Low temperature flexibility: Unaffected @ -20°F, per ASTM D1970
6. Adhesion to plywood: 3.0 lbs/in width, per ASTM D903
7. Permeance (max): 0.05 Perms, per ASTM E96
8. Material weight installed (max): 0.3 lb/ft^3, per ASTM D461

2.06 BRAKEMETAL TRIM

A. Minimum 0.040" coated aluminum, color to match roof edge metal.

1. Height: As indicated on drawings.
2. Length: 10' lengths.
   (a) Provide and install 2" wide matching vertical cleat to secure fascia at joints.

2.07 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. Screws:

1. Wood Screws: ASME B18.6.1.

2. Deck Screws: DeckMate, Hillman "Weather Maxx" or similar self-drilling bugle head screw, with a coating passing ASTM B117 1,000hr salt spray test and conforming with ICC-ES reports allowing triple zinc coating for installation in ACQ, CA or CBA treated lumber.

E. Bolts: Steel bolts complying with ASTM A 307, Grade A with ASTM A 563 hex nuts and, where indicated, flat washers.

1. Carriage bolts shall have a round, toolless head with a square neck to prevent turning.

F. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

G. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

2.08 MISCELLANEOUS MATERIALS

A. Construction Adhesive: ASTM C557 latex-based gun grade heavy duty construction adhesive, suitable for use on wood materials, including treated lumber.

III. PART 3 - EXECUTION

3.01 EXAMINATION

A. Remove debris and burrs from existing metal framing prior to attaching new blocking around existing opening.

B. Resecure any existing loose boards with new fasteners. Remove any fasteners which have popped or backed out, and resecure with new fasteners.

1. Do not drive new fasteners through existing holes.
2. Do not drive loose fasteners back into blocking.

3.02 INSTALLATION

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. At locations where new metal flashings will be in direct contact with preservative treated lumber, place a layer of seam tape, ice and water shield or other suitable barrier tape as recommended by the blocking manufacturer, to prevent the corrosion of the metal flashing.

C. 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. Set members level and plumb, in correct position. Place horizontal members flat, crown side up.

D. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.

E. Securely attach carpentry work as indicated and according to applicable codes and recognized standards.

1. All blocking and framing associated with the new window buck shall be fastened to existing construction.

2. Use fasteners of appropriate type and length. Predrill members when necessary to avoid splitting wood.

END OF SECTION

SECTION 07 50 01

MEMBRANE ROOFING
(FILED SUB BID)

I PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

B. Carefully examine all the Contract Documents for requirements which affect the work of this Section. The exact scope of this Section cannot be determined without a thorough review of all specifications sections and other Contract Documents.

C. Where referred to, Standard Specifications, Recommendations of Technical Societies, and/or Manufacturer's Associations, plus Codes of Federal, State, and Local Agencies shall include all amendments current as of date of issue of these specifications.

1.02 REQUIREMENTS FOR SUBMITTING FILED SUB-BID

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c.149 §§44A-J The time and place for submission of subbids are set forth in the Advertisement. The procedures and requirements for submitting sub-bids are set forth in the Instructions to Bidders.

B. Sub-bidders must be DCAMM Certified in the listed trade and shall include a Current DCAMM sub-bidder Certificate of Eligibility and a signed DCAMM Subbidder’s Update Statement with the bid

1. Roofing and Flashing

C. The Work of this Section is shown on Drawings:

1. A1, A2, A3

1.03 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. Removing existing roofing systems, cants, flashings, blocking as indicated and all related items down to the original metal roof deck.

2. New wood perimeter blocking and plywood substrates.

3. New single-ply roofing system comprised of rigid insulation, EPDM membrane, flexible and metal flashings and related adhesives and accessories.

B. **Alternates:**

1. 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. 02 08 00 - Asbestos Abatement, for list for asbestos containing materials.
2. 05 12 00 - Structural Steel Framing, for the replacement of existing steel beams.
3. 05 31 00 - Steel Decking, for the replacement of existing corrugated metal decking.
4. 06 10 00 - Rough Carpentry, for construction of new window buck and metal trim not associated with roofing terminations or edge.
5. 08 45 23 - Insulated Translucent Panel Wall System, for new clerestory glazing.

1.04 SUBMITTALS

A. Make submittals under provisions of Section 01 33 00.

B. Prior to starting work, the roofing contractor must submit the following:

1. Shop drawings showing layout, details of construction and identification of materials.
2. Sample of the manufacturer's Membrane System Warranty.
3. Submit a letter of certification from the manufacturer which certifies the roofing contractor is authorized to install the manufacturer's roofing system and lists foremen who have received training from the manufacturer along with the dates training was received.

C. Upon completion of the installed work, submit copies of the manufacturer's final inspection to the specifier prior to the issuance of the manufacturer's warranty.

1.05 QUALITY ASSURANCE

A. Installer: The installer must be authorized by the roofing manufacturer and their appropriate association, and must not have less than five years of experience installing the products specified.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the job site in the manufacturer's original, unopened containers or wrappings with the manufacturer's name, brand name and installation instructions intact and legible. Deliver in sufficient quantity to permit work to continue without interruption.

B. Comply with the manufacturer's written instructions for proper material storage.

1. Store materials between 60°F and 80°F in dry areas protected from water and direct sunlight. If exposed to lower temperature, restore to 60°F minimum temperature before using.
2. Store materials containing solvents in dry, well ventilated spaces with proper fire and safety precautions. Keep lids on tight. Use before expiration of their shelf life.

C. Insulation must be on pallets, off the ground and tightly covered with waterproof materials. Manufacturer's wrap does not provide sufficient waterproofing.

D. Any materials which are found to be damaged shall be removed and replaced at the applicator's expense.

1.07 WORK SEQUENCE

A. Schedule and execute work to prevent leaks and excessive traffic on completed roof sections. Care should be exercised to provide protection for the interior of the building and to ensure water does not flow beneath any completed sections of the membrane system

B. Do not disrupt activities in occupied spaces.

1.08 USE OF THE PREMISES

A. Before beginning work, the roofing contractor must secure approval from the Owner for the following:

1. Areas permitted for personnel parking.
2. Access to the site.
3. Areas permitted for storage of materials and debris.
4. Areas permitted for the location of cranes, hoists and chutes for loading and unloading materials to and from the roof.

1.09 EXISTING CONDITIONS

A. The existing roofing system generally consists of:

1. Modified Bitumen Roofing
2. ½" Fiberboard
3. 4-ply Tar and Gravel
4. ±1" Fiberboard
5. Corrugated Metal Deck

B. If discrepancies are discovered between the existing conditions noted on the Drawings and what is uncovered in the field, immediately notify the owner's representative by phone and solicit the manufacturer's approval prior to commencing with the work. Necessary steps shall be taken to make the building watertight until the discrepancies are resolved.

1.10 JOB SITE CONDITIONS

A. The roofing contractor shall adequately protect building, paved areas, service drives, lawn, shrubs, trees, etc. from damage while performing the required work. Provide canvas, boards and sheet metal (properly secured) as necessary for protection and remove protection material at completion. The contractor shall repair or be responsible for costs to repair all property damaged during the roofing application.

B. During the roofing contractor's performance of the work, the building owner will continue to occupy the existing building. The contractor shall take precautions to prevent the spread of dust and debris, particularly where such material may sift into the building. The roofing contractor shall provide labor and materials to construct, maintain and remove necessary temporary enclosures to prevent dust or debris in the construction area(s) from entering the remainder of the building.

C. Do not overload any portion of the building, either by use of or placement of equipment, storage of debris, or storage of materials.

D. Protect against fire and flame spread. Maintain proper and adequate fire extinguishers.

E. Store moisture susceptible materials above ground and protect with waterproof coverings.

F. Remove all traces of piled bulk materials and return the job site to its original condition upon completion of the work

1.11 SAFETY

A. The roofing contractor shall be responsible for all means and methods as they relate to safety and shall comply with all applicable local, state and federal requirements that are safety related. **Safety shall be the responsibility of the roofing contractor.** All related personnel shall be instructed daily to be mindful of the full time requirement to maintain a safe environment for the facility's occupants including staff, visitors, customers and the occurrence of the general public on or near the site.

1.12 WORKMANSHIP

A. Applicators installing new roof, flashing and related work shall be factory trained and approved by the manufacturer they are representing.

B. All work shall be of highest quality and in strict accordance with the manufacturer's published specifications and to the building owner's satisfaction.

C. There shall be a supervisor on the job site at all times while work is in progress.

1.13 QUALITY ASSURANCE

A. To the greatest degree possible, all products to be furnished for this project shall be manufactured by the roofing membrane manufacturer, to constitute a "system". Third party products are only acceptable where specifically accepted by the manufacturer for inclusion in the system warranty. Submit such approval on manufacturer's letterhead.

B. The manufacturer must have a minimum of 20 years experience in the manufacturing of vulcanized thermal set sheeting.

C. Unless otherwise noted in this specification, the roofing contractor must strictly comply with the manufacturer's current specifications and details.

D. The roofing system must be installed by an applicator authorized and trained by the manufacturer in compliance with shop drawings as approved by the manufacturer. The roofing applicator shall be thoroughly experienced and upon request be able to provide evidence of having at least five (5) years successful experience installing single-ply EPDM roofing systems and having installed at least one (1) roofing application or several similar systems of equal or greater size within one year.

E. Provide adequate number of experienced workmen regularly engaged in this type of work who are skilled in the application techniques of the materials specified. Provide at least one thoroughly trained and experienced superintendent on the job at all times roofing work is in progress.

F. There shall be no deviations made from this specification or the approved submittals without the prior written approval of the Architect. Any deviation from the manufacturer's installation procedures must be supported by a written certification on the manufacturer's letterhead and presented for the specifier's consideration.

G. Upon completion of the installation, the applicator shall arrange for an inspection to be made by a non-sales technical representative of the membrane manufacturer in order to determine whether or not corrective work will be required before the warranty will be issued. Notify the building owner seventy-two (72) hours prior to the manufacturer's final inspection.

1.14 JOB CONDITIONS

A. Material Safety Data Sheets (MSDS) must be on location at all times during the transportation, storage and application of materials.

B. When positioning membrane sheets, exercise care to locate all field splices away from low spots and out of drain sumps. All field splices should be shingled to prevent bucking of water.

C. When loading materials onto the roof, the roofer must comply with the requirements of the Architect to prevent overloading and possible disturbance to the building structure.

D. Proceed with roofing work only when weather conditions are in compliance with the manufacturer's recommended limitations, and when conditions will permit the work to proceed in accordance with the manufacturer's requirements and recommendations.

E. Proceed with work so new roofing materials are not subject to construction traffic. When necessary, new roof sections shall be protected and inspected upon completion for possible damage.

F. Provide protection, such as 3/4 inch thick plywood, for all roof areas exposed to traffic during construction. Plywood must be smooth and free of fasteners and splinters.

G. The surface on which the insulation or roofing membrane is to be applied shall be clean, smooth, dry, and free of projections or contaminants that would prevent proper application of or be incompatible with the new installation, such as fins, sharp edges, foreign materials, oil and grease.

H. New roofing shall be complete and weathertight at the end of the work day.

I. Contaminants such as grease, fats and oils shall not be allowed to come in direct contact with the roofing membrane.

1.15 WARRANTY

A. Roofing Contractor's Warranty:

1. The roofing subcontractor shall supply the Owner with a minimum one-year workmanship warranty. In the event any work related to the roofing, flashing, or metalwork is found to be defective within one year of substantial completion, the roofing contractor shall remove and replace such at no additional cost to the Owner. The roofing subcontractor's warranty obligation shall run directly to the building owner, and a copy the roofing signed warranty shall be sent to the roofing system's manufacturer.

B. Membrane Manufacturer's Warranty:

1. Provide manufacturer's 20 year Total System Warranty covering both labor and material with no dollar limitation.

(a.) Total system warranty shall include all roofing materials, related components and accessories including, but not limited to the substrate board, vapor retarder, insulation board, cover board, roofing membrane, membrane flashings, fasteners, adhesives, metal roof copings, metal roof edges and termination metals and roof drain assemblies. The manufacturer shall repair defects in materials and workmanship as promptly after observation as weather and site conditions permit.

2. The maximum wind speed coverage shall be peak gusts of **72** mph measured at 10 meters above ground level.

3. Pro-rated System Warranties shall not be accepted.

II PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The products to be furnished shall be provided by the manufacturer of the roofing membrane, to comprise a "system" eligible for warranty as specified in Part 1. The basis of this specification is Elevate (formerly Firestone) "RubberGard" EPDM and its related line of products manufactured by Holcim Elevate Building Products, Nashville, TN. Equal systems by the following manufacturers will also be acceptable:

1. Carlisle "Sure-Seal"
2. Johns Manville "NR 60"
3. Approved equals.

B. Unless otherwise approved by the specifier and accepted by the membrane manufacturer, all products (including insulation, fasteners, fastening plates and edgings) must be **manufactured and supplied** by the roofing system manufacturer and covered by the warranty.

2.02 UNDERLAYMENTS

A. Vapor Barrier: Elevate "V-Force" or approved equal peel-and-stick sheet comprised of SBS modified bitumen adhesive, factory-laminated to a tri-laminate woven, high-density polyethylene top surface, and meeting ASTM D5147 and the following:

1. Air permeability: 0.001 L/sec• m^2 (ASTM D 1970) and < 0.0002 ft3/min·ft^2 (ASTM E 2178)

2. Water vapor permeance: 0.04 perms when tested to ASTM E 96 procedure B

2.03 MEMBRANE

A. Furnish RubberGard 60 mil LSFR EPDM (Ethylene, Propylene, Diene Monomer) in the largest sheet possible.

1. The membrane shall conform to the minimum physical properties of ASTM D4637.
2. When a 10 foot wide membrane is to be used, the membrane shall be manufactured in a single panel with no factory splices to reduce splice intersections.
3. Membrane shall be non-reinforced.
4. Membrane shall be Fire Retardant.

2.04 INSULATION

A. Polyisocyanurate Board Insulation: Closed cell polyisocyanurate foam with black glass reinforced mat laminated to faces, complying with ASTM C 1289 Type II Class 1, with the following additional characteristics:

1. Thickness: As noted on Drawings. Where thickness exceeds 2", provide insulation in a minimum of 2 layers, installed with staggered seams.
2. Tapered insulation where indicated on drawings, with a 1/8" : 1' slope, tapering to ½" thick.
3. R-value: Minimum R6/inch.
4. Size: 48 inches by 96 inches, nominal.
5. Compressive Strength: 20 psi when tested in accordance with ASTM C 1289.
6. Ozone Depletion Potential: Zero; made without CFC or HCFC blowing agents.
7. Recycled Content: 19 percent post-consumer and 15 percent post-industrial, average.
8. Acceptable Product: ISO 95+ polyiso board insulation by Elevate or approved equal.

B. Insulation Fasteners: For use in attaching insulation to metal decks, type and size as required by roof membrane manufacturer for roofing system and warranty to be provided; use only fasteners furnished by roof membrane manufacturer.

2.05 ADHESIVES, CLEANERS AND SEALANTS

A. Membrane Bonding Adhesive: Manufacturer's LVOC high-strength, synthetic rubber adhesive used for bonding EPDM membranes to various surfaces.

B. Seam Tape: Manufacturer's standard 6" wide by 100' long pressure-sensitive splice tape used for splicing adjoining sections of EPDM membrane.

1. Membranes with pre-applied seam tape are acceptable.

C. Primer: Manufacturer's standard solvent-based primer used to prepare the surface of EPDM membrane for application of Splice Tape or Pressure-Sensitive products. Where permitted by manufacturer, primer can also be used in conjunction with Splicing Cement in lieu of Splice Cleaner.

D. Lap Sealant: Manufacturer's standard black, heavy-bodied material used to seal the exposed edges of a membrane splice or membrane/flashing edge. Color to match membrane.

E. Water Cut-Off Mastic: Manufacturer's standard one-component, low viscosity, self wetting, Butyl blend mastic used as a sealing agent between the EPDM membrane or Elastoform (uncured) Flashing and applicable substrates.

F. Pourable Sealer: Manufacturer's standard black, two-component, solvent-free, polyurethane based product used for tie-ins and as a sealant around hard-to-flash membrane penetrating objects such as clusters of pipes and for a daily seal when the completion of flashings and terminations cannot be completed by the end of each work day.

2.06 FASTENERS AND PLATES

A. Number of Fasteners:

1. When fastening through new corrugated metal decking, provide the membrane manufacturer's recommended fasteners required for attachment to meet warranty requirements.

2. When fastening through existing corrugated metal decking, provide twice the manufacturer's recommended fasteners required for attachment to meet warranty requirements.

B. Termination bar: Manufacturer's standard 1" x .040" x 10' long galvalume-coated steel fastening bar used with HD Fasteners for membrane securement into steel or wood decks.

1. Where termination bars are used at masonry or concrete materials, provide manufacturer's standard 1-1/4" long expansion anchor with a zinc plated steel drive pin.

C. Membrane transition strips: Manufacturer's standard 9" wide, nominal 45-mil thick clean, cured black reinforced EPDM membrane 6" wide Factory-Applied seam tape laminated along one edge.

2.07 METAL EDGING AND MEMBRANE TERMINATIONS

A. Metal Roof Edging and Fascia: Continuous metal edge member serving as termination of roof membrane and retainer for metal fascia; watertight with no exposed fasteners; mounted to roof edge nailer.

1. Wind Performance:

(a.) Membrane Pull-Off Resistance: 100 lbs/ft minimum, when tested in accordance with ANSI/SPRI ES-1 Test Method RE-1, current edition.
(b.) Fascia Pull-Off Resistance: At least the minimum required when tested in accordance with ANSI/SPRI ES-1 Test Method RE-2, current edition.

2. Description: Elevate "Anchorgard SP Fascia" or approved equal meeting the following:

(a.) Fascia Face Height: As indicated on drawings.
(b.) Fascia Material and Finish: .040" aluminum with Kynar 500 finish, Color by Owner; matching concealed joint splice plates; factory-installed protective plastic film.
(c.) Length: 144 inches.
(d.) Anchor Bar: 22 gage, 0.036 inch (0.9 mm) G90 coated commercial type galvanized steel with pre-punched holes.
(e.) Fasteners: Factory-provided corrosion resistant fasteners, with drivers; no exposed fasteners permitted.

3. Description: Elevate "Continuous Cleat Coping" or approved equal meeting the following:

(a.) Fascia Face Height: As indicated on drawings.
(b.) Fascia Material and Finish: .040" aluminum with Kynar 500 finish, Color by Owner; matching concealed joint splice plates; factory-installed protective plastic film.
(c.) Length: 144 inches.
(d.) Anchor Bars: 20 ga. Galvanized continuous cleats on inside and outside.
(e.) Fasteners: Factory-provided corrosion resistant fasteners, with drivers; no exposed fasteners permitted.
(f.) Provide manufacturer's splice plate between coping cover and cleats.

2.08 ACCESSORY MATERIALS

A. Wood Nailers: PS 20-dimension lumber, Structural Grade No. 2 or better Southern Pine, Douglas Fir; or PS1, APA Exterior Grade plywood; pressure preservative treated.

1. Dimensions: As indicated on drawings.

B. Metal Fascia edge extender: minimum 0.040" coated aluminum, color to match edge metal.

1. Height: As indicated on drawings.
2. Secure with 0.024" stainless steel continuous cleat.

C. Pipe flashing: molded EPDM boot-style flashing with pressure-sensitive adhesive flange. Provide stainless steel clamp ring and water cut-off mastic.

D. Walk Pads: Elevate “Quickseam” Walkway Pad, or approved equal meeting the following:

1. Dimensions: 30" x 30" x .30" thick.
2. Color: Black
3. Material: Rubber with adhesive tape laminated to the bottom surface.

E. Rooftop Utility Supports (“Caddy Supports”): replace all wood sleepers supporting rooftop utilities with Eaton “Dura-Blok” or approved equal pre-fabricated supports constructed of 100% recycled rubber and polyurethane prepolymer with a uniform load capacity of 500 pounds per linear foot of support, meeting the following:

1. Width: 6" minimum.
2. Height: as required by taper of roof and height of existing utility.
3. Include integral through-bolted unistrut galvanized per ASTM A653 for securing utilities to support
4. Attaching hardware: Zinc-plated threaded rod, nuts and attaching hardware per ASTM B633.

F. Roof Drains: Basis of Design Zurn Z100F floforce high performance roof drain, or approved equal product by Watts or Jay R. Smith meeting the requirements specified herein:

1. Epoxy-coated cast iron body with combination membrane flashing clamp/gravel guard.
2. Provide dome grate strainer.
3. Outlet: 4" no hub.
4. Pipe size: Match existing. GC verify in field.
5. Provide new drain pipe and accessories to tie into existing roof drain pipes.

(a.) Drain pipe: Epoxy-coated 4" cast iron drain pipe to match existing.

III PART 3 EXECUTION

3.01 EXAMINATION

A. The existing roof is in a state of partial collapse and is unsafe. Examine the existing structure from below prior to walking on the roof to identify areas at risk of immediate collapse.

B. Prior to the start of work, the roofer shall examine the project area and the surrounding site, to develop a logistical plan for the execution of the work. The following shall be reviewed and discussed with the Owner:

1. Location of dumpsters and chutes.
2. Method of preventing adhesive fumes from entering the building HVAC.
3. Locations of cranes, Lulls or other hoisting equipment, and location of stockpiled materials on roof.

C. Prior to the start of demolition, the roofer shall arrange an on-site conference with a field representative for the membrane manufacturer, to review any special details which may be required for issuance of the specified warranty. The roofer shall be prepared to perform any test cuts or exploratory work required by the manufacturer’s representative, and to patch the same.

3.02 COORDINATION

A. The roofer shall coordinate his operations with the Owner, relative to the continued use of the building by tenants as the work progresses.

3.03 DEMOLITION

A. Do not remove materials when the forecast is for rain or high winds. Should inclement weather arise at any time during the project, the roofer shall cease operations and secure the roof and any stored materials from damage by wind or rain. Remove roofing systems and insulation taking care to protect and preserve the existing roof deck. Remove all cants, rubber or metal flashings, drain strainers and other work as detailed. Coordinate the disconnection/reconnection of rooftop equipment by licensed plumbers or electricians as required to install the new roofing system.

3.04 GENERAL

A. Comply with the manufacturer's published instructions for the installation of the membrane roofing system including proper substrate preparation, jobsite considerations and weather restrictions.

B. Position sheets to accommodate contours of the roof deck and shingle splices to avoid bucking water.

3.05 UNDERLAYMENT PLACEMENT

A. Install vapor barrier over metal deck or cover board as indicated on drawings. Place sheets shingle-style, starting a low points and extending up the slope of the roof. Lap edges as recommended by the barrier manufacturer.

3.06 INSULATION PLACEMENT

A. Install insulation in configuration and with attachment method(s) specified in PART 2, under Roofing System.

B. Install only as much insulation as can be covered with the completed roofing system before the end of the day's work or before the onset of inclement weather.

C. Lay first layer of roof insulation in courses parallel to roof edges and second layer rotated 90 degrees. Stagger layer joints.

D. Neatly and tightly fit insulation to all penetrations, projections, and nailers, with gaps not greater than 1/4 inch. Fill gaps greater than 1/4 inch with acceptable insulation. Do not leave the roofing membrane unsupported over a space greater than 1/4 inch.

E. Mechanical Fastening: Using specified fasteners and insulation plates engage fasteners through insulation into deck to depth and in pattern required by the membrane manufacturer, for the windspeed to be warrantied.

3.07 MEMBRANE PLACEMENT AND BONDING

A. Unroll and position membrane without stretching. Allow the membrane to relax for approximately 1/2 hour before bonding. Fold the sheet back onto itself so half the underside of the membrane is exposed.

B. Apply the Bonding Adhesive in accordance with the manufacturer's published instructions, to both the underside of the membrane and the substrate. Allow the adhesive to dry until it is tacky but will not string or stick to a dry finger touch.

1. Roll the coated membrane into the coated substrate while avoiding wrinkles. Brush down the bonded half of the membrane sheet with a soft bristle push broom to achieve maximum contact.
2. Fold back the unbonded half of the membrane sheet and repeat the bonding procedure.

C. Install adjoining membrane sheets in the same manner, overlapping edges approximately 4 inches. Do not apply bonding adhesive to the splice area.

3.08 MEMBRANE SPLICING

A. Splice and seal all membrane intersections using seam tape, following the manufacturer's requirements for the specified warranty.

B. Use primers and membrane cleaners prior to applying tape.

C. Roll the splice using positive pressure when using a 2" wide steel roller. Roll across the splice edge, not parallel to it.

D. At all field splice intersections, apply Lap Sealant along the edge of the membrane splice to cover the exposed tape in each direction from the splice intersection. Install "T" Joint Covers or a 6" wide section (with rounded corners) of Pressure-Sensitive Flashing over the field splice intersection.

3.09 ROOF DRAIN INSTALLATION

A. Install roof drains at low points of roof areas according to roof membrane manufacturer's written installation instructions.

1. Install flashing collar or flange of roof drain to prevent leakage between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.
   (a.) Secure flashing into sleeve and specialty clamping ring or device.
2. Position roof drains for easy access and maintenance.

3.10 FLASHING

A. Install flashings, including laps, splices, joints, bonding, adhesion, and attachment, as required by membrane manufacturer's recommendations and details.

B. Metal Accessories: Install metal edgings in locations indicated on the drawings, with horizontal leg of edge member over membrane and flashing over metal onto membrane.

1. Follow roofing manufacturer's instructions.
2. Remove protective plastic surface film immediately before installation.
3. Install water block sealant under the membrane anchorage leg.
4. Flash with manufacturer's recommended flashing sheet unless otherwise indicated.
5. Where single application of flashing will not completely cover the metal flange, install additional piece of flashing to cover the metal edge.
6. If the roof edge includes a gravel stop and sealant is not applied between the laps in the metal edging, install an additional piece of self-adhesive flashing membrane over the metal lap to the top of the gravel stop; apply seam edge treatment at the intersections of the two flashing sections.
7. When the roof slope is greater than 1:12, apply seam edge treatment along the back edge of the flashing.

C. Flashing at Walls, Curbs, and Other Vertical and Sloped Surfaces: Install weathertight flashing at all walls, curbs, parapets, curbs, skylights, and other vertical and sloped surfaces that the roofing membrane abuts to; extend flashing at least 8 inches high above membrane surface.

1. Use the longest practical flashing pieces.
2. Evaluate the substrate and overlay and adjust installation procedure in accordance with membrane manufacturer's recommendations.
3. Complete the splice between flashing and the main roof sheet with specified splice adhesive before adhering flashing to the vertical surface.
4. Provide termination directly to the vertical substrate as shown on roof drawings. Wall and curb flashing shall be cured EPDM membrane. Continue the deck membrane as wall flashing where practicable.

D. Follow manufacturer's typical flashing procedures for all wall, curb, and penetration flashing including metal edging and roof drain applications.

3.11 WALKWAY PADS

A. Position the Walkway pads so that the flat surface is over the completed roof membrane, spacing each pad a

minimum of 1" (25.4 mm) and a maximum 6" (152.4 mm) from each other to allow for drainage. Ensure spacing is consistent with a tolerance of 1/4".

B. Where installation of the Walkway Pads is over field fabricated seams, or within 3" (76.2 mm) of a lap edge, the seam must be stripped in using 5" Seam Flashing. Apply the Seam Flashing over the field seam for a distance of 6" (152.4 mm) minimum past each side of the walkway pad.

C. Installation

1. Provide manufacturer's primer and scrubber to clean and prime the membrane prior to installation of Walkway Pads.
2. Allow primer to dry according to the touch-push test.
3. Remove the release paper on the tape and place the taped walkway pad into place on the primed membrane.
4. Walk on the pad to assure proper overall adhesion.

3.12 DAILY SEAL

A. If the reroofing cannot be completed in one day, a daily seal must be performed to temporarily close the membrane to prevent water infiltration.

B. Complete an acceptable membrane seal in accordance with the manufacturer's requirements.

3.13 CLEAN UP

A. Perform daily clean-up to collect all wrappings, empty containers, paper, and other debris from the project site. Upon completion, all debris must be disposed of in a legally acceptable manner.

B. Prior to the manufacturer's inspection for warranty, the applicator must perform a pre-inspection to review all work and to verify all flashing has been completed as well as the application of all caulking.

END OF SECTION

SECTION 08 45 23

INSULATED TRANSLUCENT PANEL WALL SYSTEM
(FILED SUB BID)

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

B. Carefully examine all the Contract Documents for requirements which affect the work of this Section. The exact scope of this Section cannot be determined without a thorough review of all specifications sections and other Contract Documents.

C. Where referred to, Standard Specifications, Recommendations of Technical Societies, and/or Manufacturer's Associations, plus Codes of Federal, State, and Local Agencies shall include all amendments current as of date of issue of these specifications.

1.2 REQUIREMENTS FOR SUBMITTING FILED SUB-BID

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c.149 §§44A-J The time and place for submission of subbids are set forth in the Advertisement. The procedures and requirements for submitting sub-bids are set forth in the Instructions to Bidders.

B. Sub-bidders must be DCAMM Certified in the listed category and shall include a Current DCAMM sub-bidder Certificate of Eligibility and a signed DCAMM Subbidder's Update Statement with the bid.

1. Metal Windows

C. The Work of this Section is shown on Drawings:

1. A1, A3

1.3 SCOPE 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. Installation of new insulated translucent glazing system.
2. Aluminum sill flashing.

B. **Alternates:**

1. 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. 02 08 00 - Asbestos Abatement, for removal of existing glazing units.
2. 06 10 00 - Rough Carpentry, for installation of window buck.

1.4 SUBMITTALS

A. Make submittals under provisions of Section 01 33 00.

B. Submit manufacturer's product data. Include construction details, material descriptions, profiles, and finishes of components.

C. Submit shop drawings. Include plans, elevations, and details.

D. Submit manufacturer's color charts showing the full range of colors available for factory finished exposed aluminum.

1. When requested, submit samples for each exposed finish required, in same thickness and material indicated for the work and in size indicated below.

a. Sandwich panels: 7" x 12" units
b. Factory finished aluminum: 3" long sections

E. Submit Installer Certificate, signed by installer, certifying compliance with project qualification requirements.

F. Submit product reports from a qualified independent testing agency indicating each type and class of panel system complies with the project performance requirements, based on comprehensive testing of current products. Previously completed reports will be acceptable if for current manufacturer and indicative of products used on this project.

1. Reports required (if applicable) are:

a. Flame Spread and Smoke Developed (UL 723) – Submit UL Card
b. Burn Extent (ASTM D 635)
c. Color Difference (ASTM D 2244)
d. Impact Strength (UL 972)
e. Bond Tensile Strength (ASTM C 297 after aging by ASTM D 1037)
f. Bond Shear Strength (ASTM D 1002)
g. Beam Bending Strength (ASTM E 72)
h. Insulation U-Factor (NFRC 100)
i. NFRC System U-Factor Certification (NFRC 700)
j. NFRC Visible Light Transmittance (NFRC 202)
k. Solar Heat Gain Coefficient (NFRC or Calculations)
l. Condensation Resistance Factor (AAMA 1503) (Thermally Broken, insulated panels only)
m. Air Leakage (ASTM E 283)
n. Structural Performance (ASTM E 330)
o. Water Penetration (ASTM E 331)

1.5 QUALITY ASSURANCE

A. Manufacturer's Qualifications:

1. Material and products shall be manufactured by a company continuously and regularly employed in the manufacture of specified materials for a period of at least ten consecutive years and which can show evidence of those materials being satisfactorily used on at least six projects of similar size, scope, and location. At least three of the projects shall have been in successful use for ten years or longer.

2. Panel system must be listed by an ANSI accredited Evaluation Service, which requires quality control inspections and fire, structural, and water infiltration testing of sandwich panel systems by an accredited agency.

3. Quality control inspections shall be conducted at least once each year and shall include manufacturing facilities, sandwich panel components, and production sandwich panels for conformance with AC177 "Translucent Fiberglass Reinforced Plastic (FRP) Faced Panel Wall, Roof and Skylight Systems" as issued by the ICC-ES.

B. Installer's Qualifications: Installation shall be by an experienced installer, which has been in the business of installing panel systems for at least two consecutive years and can show evidence of satisfactory completion of projects of similar size, scope, and type.

1.6 PERFORMANCE REQUIREMENTS

A. The manufacturer shall be responsible for the configuration and fabrication of the complete panel system.

1. When requested, include span analysis data.

2. Standard panel system shall have less than 0.01 cfm/ft² air leakage by ASTM E 283 at 6.24 PSF (50 mph) and no water penetration by ASTM E 331 at 15 PSF; and structural testing by ASTM E 330.

3. Structural Loads. Provide system capable of handling the following loads:

a. Positive Wind Load (PSF): +19.8 psf.

b. Negative Wind Load (PSF): -21.5 psf.

c. At salient corners (PSF): -26.6 psf.

B. Deflection Limits:

1. Walls: Limited to L/120 of clear span for each assembly component.

C. Thermal Movements: Allow for thermal movements from ambient- and surface-temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 110 deg F (43 deg C), ambient; 150 deg F (66 deg C), material surfaces.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver panel system, components, and materials in manufacturer's standard protective packaging.

B. Store panels on the long edge; several inches above the ground, blocked and under cover in accordance with manufacturer's storage and handling instructions.

1.8 WARRANTY

A. Provide manufacturer's and installer's written warranties agreeing to repair or replace panel system work, which fails in material or workmanship, within one year from the commencement date. The commencement date of the warranty shall be the date of substantial completion, but no more than six months from date of delivery. Failure of material or workmanship shall include deterioration of finish on metal in excess of normal weathering; and defects in accessories; insulated, translucent sandwich panels; and other components of the work

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. The basis for this specification is for products manufactured by Kalwall Corporation (Kalwall Corporation, Tel: (800) 258-9777 – Fax: (603) 627-7905 – Email: info@kalwall.com). Equal products meeting the requirements specified herein shall be accepted by the following manufacturers:

1. Creative Composites Group
2. Kingspan Light+Air

2.2 PANEL COMPONENTS

A. Face Sheets:

1. Translucent faces: Manufactured from glass fiber reinforced thermoset resins, formulated specifically for architectural use.

a. Thermoplastic (e.g. polycarbonate, acrylic) faces are not acceptable.

b. Face sheets shall not deform, deflect, or drip when subjected to fire or flame.

2. Interior face sheets:

a. Flame spread: Underwriters Laboratories (UL) listed, which requires periodic unannounced retesting, with flame spread rating no greater than 50 and smoke developed no greater than 450 when tested in accordance with UL 723.

b. Burn extent by ASTM D 635 shall be no greater than 1".

3. Exterior face sheets:

a. Color stability: Full thickness of the exterior face sheet shall not change color more than 3 CIE Units DELTA E by ASTM D 2244 after 3 years outdoor South Florida weathering at 5° facing south as measured on a white sample, with and without a protective film or coating to ensure long-term color stability. Color stability shall be unaffected by abrasion or scratching.

b. Strength: Exterior face sheet shall be uniform in strength, impenetrable by hand held pencil and repel an impact minimum of 70 ft. lbs. without fracture or tear when impacted by a 3-1/4" diameter, 5 lb. free-falling ball per UL 972.

c. Erosion Protection: Integral, embedded-glass erosion barrier.

4. Appearance:

a. Exterior face sheet: Smooth, .070” thick and Crystal in color.
b. Interior face sheet: Smooth, .045” thick and White in color.
c. Face sheets shall not vary more than ± 10% in thickness and be uniform in color.

B. Grid Core:

1. Thermally Broken Composite I-beam grid core shall be of alloy and temper recommended by manufacturer with provisions for mechanical interlocking of muntin-mullion and perimeter. Width of I-beam shall be no less than 7/16”.

2. I-beam Thermal break: Minimum 1”, thermoset fiberglass composite. Poured and de-bridged thermal break is not acceptable.

C. Laminate Adhesive:

1. Heat and pressure resin type adhesive engineered for structural sandwich panel use, with minimum 25-years field use. Adhesive shall pass testing requirements specified by the International Code Council “Acceptance Criteria for Sandwich Panel Adhesives".

2. Minimum tensile strength of 750 PSI when the panel assembly is tested by ASTM C 297 after two exposures to six cycles each of the aging conditions prescribed by ASTM D 1037.

3. Minimum shear strength of the panel adhesive by ASTM D 1002 after exposure to four separate conditions:

a. 50% Relative Humidity at 68° F: 540 PSI

b. 182° F: 100 PSI

c. Accelerated Aging by ASTM D 1037 at room temperature: 800 PSI

d. Accelerated Aging by ASTM D 1037 at 182° F: 250 PSI

2.3 PANEL CONSTRUCTION

A. Provide sandwich panels of flat fiberglass reinforced translucent face sheets laminated to a grid core of mechanically interlocking I-beams. The adhesive bonding line shall be straight, cover the entire width of the I-beam and have a neat, sharp edge.

1. Thickness: 2-3/4 inches

2. Grid Core Insulation: Fill panel cores with air

3. Panel U-factor by NFRC certified laboratory:

a. 2-3/4” thermally broken grid 0.30 U-Factor, or better.

4. Visible Light Transmittance (VLT):

a. Visible LT (NFRC 202) by NFRC certified laboratory: 37%

b. Solar heat gain coefficient 0.38

5. Grid pattern as viewed: Nominal size 20 x 12 ; pattern Shoji

B. Standard panels shall deflect no more than 1.9” at 30 PSF in 10’-0” span without a supporting frame by ASTM E 72.

C. Panels shall meet the conditions of acceptance according to ASTM E2707 Fire Penetration of Exterior Wall Assemblies Using a Direct Flame Impingement Exposure:

1. Absence of flame penetration through the wall assembly at any time.

2. Absence of evidence of glowing combustion on the interior surface of the assembly at the end of the 60-min observation period.

3. Absence of evidence of flame, glow, and smoke if the test is terminated prior to the completion of the 60-min observation period.

D. Thermally broken, insulated panels: Minimum Condensation Resistance Factor of 80 by AAMA 1503 measured on the bond line.

2.4 ALUMINUM CLAMPTITE INSTALLATION SYSTEM

A. Aluminum clamptite installation system:

1. Thermally Broken clamp-tite screw type closure system shall be of extruded aluminum alloy and temper as recommended by manufacturer.

B. Sealing tape: Manufacturer's standard, pre-applied to aluminum clamptite installation system at the factory under controlled conditions.

C. Fasteners: 300 series stainless steel screws for aluminum clamptite installation system, excluding final fasteners to the building.

D. Finish: Manufacturer's factory applied finish, which meets the performance requirements of AAMA 2604. Color to be selected by Owner during submittal process.

2.5 BACKER ROD SEALANT

A. Backer rod: 3/4" Closed cell backer rod meeting the following properties:

1. Chemical Base: Closed cell polyethylene foam.
2. Packaging: 3/4" diameter by 20ft per bag.
3. Color: Light Gray.
4. Density: 2.0 lbs/ ft3, per ASTM D1622.
5. Tensile Strength: 50 psi, per ASTM D1623
6. Service Temperature: -90°F to 210°F
7. Water Absorption: 0.03 gm/cc, per ASTM C1016

B. Sealant: Basis of Design is Sikaflex-201 US. Approved equal products by Bostik or Tremco are acceptable meeting the following properties:

1. Meets the requirements of AAMA 803.3 Type I and AAMA 808.3
2. Tested to ASTM E84
3. Tested to ASTM E90
4. Chemical Base: 1-component polyurethane.
5. Color: Aluminum gray
6. Cure mechanism: Moisture-curing.

7. Tensile strength: 1.3 MPa (190 psi), per ASTM D412.
8. Elongation at break: 550%, per ASTM D412.
9. Application temperature: 41-104 °F.
10. Service temperature: -40-194 °F.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Installer shall examine substrates, supporting structure, and installation conditions.

B. Do not proceed with panel installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by sealant manufacturer for this purpose.

2. Where aluminum will contact concrete, masonry, or pressure treated wood, protect against corrosion by painting contact surfaces with bituminous paint or self-adhered flashing tape, or method recommended by sealant manufacturer.

3.3 INSTALLATION

A. Install the panel system in accordance with the manufacturer's fabrication drawings and suggested installation instructions.

1. Anchor component parts securely in place by permanent mechanical attachment system.

2. Accommodate thermal and mechanical movements.

3. Seal aluminum clamptite installation system as shown on the manufacturer’s fabrication drawings and suggested installation instructions.

B. Install joint sealants at perimeter joints and within the panel system in accordance with manufacturer’s fabrication drawings and suggested installation instructions.

3.5 CLEANING

A. Clean the panel system, interior and exterior, immediately after installation.

B. Refer to manufacturer's written recommendations.

END OF SECTION 08 45 23

SECTION 09 90 01

PAINTING

I. PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

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. Carefully examine all the Contract Documents for requirements which affect the work of this Section. The exact scope of this Section cannot be determined without a thorough review of all specifications sections and other Contract Documents.

C. Where referred to, Standard Specifications, Recommendations of Technical Societies, and/or Manufacturer's Associations, plus Codes of Federal, State, and Local Agencies shall include all amendments current as of date of issue of these specifications.

1.02 REQUIREMENTS FOR SUBMITTING FILED SUB-BID

A. Sub-bids shall be submitted for the Work of this Section in accordance with the provisions of M.G.L. c.149 §§44A-J The time and place for submission of subbids are set forth in the Advertisement. The procedures and requirements for submitting sub-bids are set forth in the Instructions to Bidders.

B. Sub-bidders must be DCAMM Certified in the listed trade and shall include a Current DCAMM sub-bidder Certificate of Eligibility and a signed DCAMM Subbidder’s Update Statement with the bid

1. Painting

C. The Work of this Section is shown on Drawings:

1. A1, A2, A3

1.03 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. Surface preparation and priming of surfaces to be painted.
2. Painting interior wood finish materials.
3. Painting underside of roof deck and all sides of structural steel.

B. **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.

C. **Items to Be Furnished Only:** Furnish the following items for installation by the designated Sections:

1. None.

D. **Related Work Specified Elsewhere:** The following items are not included in this Section, and will be performed under the designated Section:

1. 05 12 00 - Structural Steel Framing, for shop priming of new structural steel.

1.04 SUBMITTALS

A. Submit product data on all finishing products under provisions of Section 01 33 00.

B. Submit one complete set of color chips for color selection.

C. Submit manufacturer’s literature on surface preparation methods.

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. 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.

II. PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Materials listed are generally based on Sherwin-Williams products. Substitutions of equal quality products from Benjamin Moore, PPG or other major paint manufacturers will be acceptable.

2.02 WOOD PRIMER

A. Sherwin Williams Exterior Acrylic Latex Primer

1. Waterbased wood primer.
2. 100% Acrylic formula.
3. Mildew resistant.
4. Low VOC.
5. Suitable for topcoating with acrylic latex finish.
6. Compatible with exterior-grade plywood substrate.

2.03 TOP COATING

A. Exterior Wood Paint: Sherwin Williams “Duration” Exterior Acrylic Latex.

1. Flat finish.
2. Low temperature application down to 35°F.
3. Self-priming.
4. Excellent durability and hiding.
5. Mildew resistant.
6. Suitable for exterior exposure.

B. Metal Decking and Framing: Sherwin Williams “Pro Industrial” Multi-surface Acrylic B66

1. Matte finish.

2. Self-priming directly to multiple surfaces.
3. Excellent one-coat hide and stain blocking.
4. Excellent adhesion to slick and glossy surfaces.
5. Abrasion resistant.
6. Optimized for spray application.
7. Dries fast and dry falls in 10 feet.

2.04 PATCHING MATERIALS

A. Exterior-grade wood filler.

B. Acrylic latex caulking complying with ASTM C834 or ASTM C920 where movement capability is required.

2.05 ACCESSORIES

A. Masking materials.

B. Drop cloths.

C. Cleaning solvents recommended by coating manufacturer.

D. Application equipment recommended by manufacturer.

III. PART 3 - EXECUTION

3.01 INSPECTION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. Beginning of installation means acceptance of existing surfaces.

3.02 WOOD PREPARATION

A. Correct minor defects and clean surfaces which affect work of this Section.

B. Shellac and seal marks which may bleed through surface finishes.

C. Prime all exposed edges of plywood.

D. Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.

3.03 STEEL PREPARATION

A. Ensure shop primer has been applied per Section 05 12 00.

B. At existing decking and framing, remove existing corrosion with sandpaper, wire brush, or other abrading method.

C. Apply field primer to galvanized decking the same day it was cleaned.

3.04 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.

3.05 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 and allow applied coat to dry before next coat is applied.

D. Sand lightly between coats to achieve required finish.

3.06 FIELD QUALITY CONTROL

A. Inspect each coat before applying the next coat.

B. Verify complete coverage with no runs, sags, blistering, or fisheyes/pinholes.

C. Repair damaged or defective coating areas until acceptable.

3.07 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.

3.08 PROTECTION

A. Protect completed work from damage until Substantial Completion.

B. Repair damaged painted surfaces to match adjacent finishes with no visible transition.

3.09 PAINT SCHEDULE

A. Wood:

1. 1st Coat: Exterior Acrylic Latex Primer
2. 2nd Coat: SW “Duration” Exterior Acrylic Latex
3. 3rd Coat: SW “Duration” Exterior Acrylic Latex

B. Metal Deck and Framing:

1. 1st Coat: SW “Pro Industrial” Multi-surface Acrylic Matte, B66-1571 Series
2. 2nd Coat: SW “Pro Industrial” Multi-surface Acrylic Matte, B66-1571 Series

END OF SECTION