CITY OF NEW BEDFORD
NEW BEDFORD POLICE STATION HEADQUARTERS
SALLY PORT ADDITION & PARKING LOT RESURFACE
871 ROCKDALE AVENUE, NEW BEDFORD, MA 02740

PROJECT MANUAL

December 5, 2018

ARCHITECT
MOUNT VERNON GROUP ARCHITECTS, INC.
47 N. Second Street
New Bedford, MA 04720
(508) 991-7500

STRUCTURAL ENGINEER
SOUZA, TRUE AND PARTNERS
265 Winter Street, 3rd Floor
Waltham, MA 02451
(617) 926-6100

FIRE SUPPRESSION, PLUMBING, MECHANICAL, ELECTRICAL ENGINEER
NANGLE ENGINEERING, INC.
32 Prince Street
Danvers, MA 01923
(978) 777-7650
# NB Police Station Headquarters – Sally Port Addition

**New Bedford, Massachusetts**

Mount Vernon Group Architects, Inc., Project No. 02014.43

## Table of Contents

### Division 00 - Contracts and Conditions

- 00 00 01 - Table of Contents
- 00 00 02 - List of Drawings
- 00 00 20 - City of New Bedford Front End Documents
- 00 09 00 - Labor Standards of the Commonwealth
  - Commonwealth of Massachusetts Prevailing Wage Rates
  - Commonwealth of Massachusetts Department of Occupational Safety Apprentice Wage Rates

### Division 01 - General Requirements

- 01 00 00 - General Requirements
- 01 26 00 - Contract Modification Procedures
- 01 31 00 - Project Management and Coordination
- 01 33 00 - Submittal Procedures
- 01 40 00 - Quality Requirements
- 01 50 00 - Temporary Facilities and Controls
- 01 51 00 - Cutting and Patching
- 01 51 11 - Progress Schedule
- 01 60 00 - Product Requirements
- 01 71 00 - Cleaning
- 01 78 39 - Project Record Documents
- 01 91 15 - General Testing Requirements

### Division 02 - Existing Conditions

- 02 41 13 – Selective Demolition

### Division 03 - Concrete

- 03 30 00 – Cast-In-Place Concrete
- 03 31 00 - Concrete Formwork
- 03 31 13 - Concrete Reinforcing

### Division 04 - Masonry

- 04 01 20.91 – Concrete Masonry Unit (CMU) Wall Restoration
- * 04 20 00 – Unit Masonry
- * 04 21 11 – Reinforced Unit Masonry

### Division 05 – Metals

- 05 12 00 – Structural Steel Framing
- 05 21 00 – Steel Joist Framing
- 05 31 00 – Steel Decking
- 05 50 00 – Metal Fabrications
- 05 52 13 – Steel Handrails and Guardrails

### Division 06 - Wood and Plastics

- 06 10 00 - Rough Carpentry
- 06 20 00 – Finish Carpentry

* Indicates Filed Sub-Bids
NB POLICE STATION HEADQUARTERS – SALLY PORT ADDITION
NEW BEDFORD, MASSACHUSETTS

Mount Vernon Group Architects, Inc., Project No. 02014.43

December 5, 2018

SPECIFICATION SECTION

DIVISION 07 - THERMAL AND MOISTURE PROTECTION
07 21 00 – Thermal Insulation
07 25 00 – Weather Barriers
* 07 54 19 – Polyvinyl-Chloride (PVC) Roofing
* 07 62 00 – Sheet Metal Flashing and Trim
07 92 00 – Joint Sealants
07 95 00 – Expansion Control

DIVISION 08 - DOORS AND WINDOWS
08 11 13 – Hollow Metal Doors and Frames
08 36 10 – Sectional Overhead Doors
08 71 00 – Door Hardware
08 80 00 – Glazing

DIVISION 09 - FINISHES
09 22 16 – Non-Structural Metal Framing and Gypsum Board
09 91 13 – Painting

DIVISION 10 - SPECIALTIES
NO WORK IN THIS DIVISION

DIVISION 11 - EQUIPMENT
NO WORK IN THIS DIVISION

DIVISION 12 - FURNISHINGS
NO WORK IN THIS DIVISION

DIVISION 13 - SPECIAL CONSTRUCTION
NO WORK IN THIS DIVISION

DIVISION 14 - CONVEYING EQUIPMENT
NO WORK IN THIS DIVISION

DIVISION 21 – FIRE SUPPRESSION
21 00 00 – Fire Suppression

DIVISION 22 – PLUMBING
22 00 00 – Plumbing

DIVISION 23 – HEATING VENTING AND AIR CONDITIONING
* 23 00 00 – Heating, Ventilating, and Air Conditioning (HVAC)

DIVISION 26 – ELECTRICAL
26 00 00 – Electrical

DIVISION 27 – COMMUNICATIONS
NO WORK IN THIS DIVISION

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY
NO WORK IN THIS DIVISION

* Indicates Filed Sub-Bids

Table of Contents
00 00 01 - 2
**SPECIFICATION SECTION**

**DIVISION 31 - EARTHWORK**
- 31 10 00 – Site Clearing
- 31 20 00 – Earth Moving

**DIVISION 32 - EXTERIOR IMPROVEMENTS**
- 32 12 00 – Site Improvements

**DIVISION 33 - UTILITIES**
NO WORK IN THIS DIVISION

**END OF SECTION**
LIST OF DRAWINGS

ARCHITECTURAL
D1.01 DEMOLITION – FLOOR PLAN – DEMOLITION GENERAL & KEY NOTES
D1.02 DEMOLITION – EXISTING CONDITIONS PHOTOS
A1.01 FLOOR PLAN
A2.01 ROOF PLAN
A4.01 EXTERIOR ELEVATIONS
A4.02 EXTERIOR AND INTERIOR ELEVATIONS, ENLARGED PLAN, & SCHEDULES
A5.01 SECTIONS
A6.01 MISCELLANEOUS DETAILS
A7.01 ENLARGED RAMP AND STAIR PLAN, SECTION & DETAILS

STRUCTURAL
S0.01 GENERAL NOTES
S0.02 TYPICAL DETAILS
S0.03 TYPICAL DETAILS
S1.01 NEW ADDITION FOUNDATION / FIRST FLOOR PLAN
S1.02 NEW ADDITION ROOF FRAMING PLAN
S2.01 SECTIONS

MECHANICAL
M1.01 MECHANICAL - NEW WORK FLOOR PLAN, LEGEND, SCHEDULES, AND DETAILS

PLUMBING
P1.01 PLUMBING - NEW WORK FLOOR PLAN

FIRE PROTECTION
FP1.01 FIRE PROTECTION - NEW WORK FLOOR PLAN

ELECTRICAL
E1.01 ELECTRICAL – DEMOLITION FLOOR PLAN
E2.01 ELECTRICAL – NEW WORK FLOOR PLAN

END OF SECTION
ARTICLE 1 - EMPLOYMENT, HOURS AND WAGES

1.1. The Contractor and any Subcontractor shall conform to any Labor Laws of the Commonwealth, and, without limiting the generality of the foregoing, shall conform to the provisions of Sections 25, 26, 27B, 30, 34, 34A and 34B of Chapter 149 of the General Laws, as amended, which Sections are incorporated herein by reference and made a part hereof.

1.2. Every employee in the work to be performed under this Contract shall lodge, board and trade where and with whom he elects, and the Contractor and any Subcontractor shall not directly or indirectly require, as a condition of employment in said work, that an employee shall lodge, board or trade at a particular place or with a particular person.

1.3. The Contractor and any Subcontractor shall give preference in the employment of mechanics, teamsters, chauffeurs and laborers first to citizens of the Commonwealth who have been residents of the Commonwealth for at least six months at the commencement of their employment who are veterans as defined in clause Forty-three of Section Seven of Chapter Four, and who are qualified to perform the work to which the employment relates; and secondly, to citizens of the Commonwealth generally who have been residents of the Commonwealth for at least six months at the commencement of their employment, and if they cannot be obtained in sufficient numbers, then to citizens of the United States.

1.4. No laborer, workman, mechanic, foreman, or inspector working in the employment of the Contractor, Subcontractor or other person doing or contracting to do the whole or a part of the work contemplated by this Contract, shall be required or permitted to work any more than eight hours in any one day, or more than forty-eight hours in any one week, except in cases of emergency.

1.5. The rate per hour of the wages to be paid to mechanics, teamsters, chauffeurs, and laborers in the work to be performed under this Contract shall not be less than the rate of wages in the schedule annexed hereto and made a part hereof as determined by the Commissioner of Labor and Industries of the Commonwealth. This schedule shall continue to be the minimum rate of wages for said employees during the life of this Contract.

1.6. The Contractor shall pay to any reserve police officer employed by him in any City or Town the prevailing rate of wages paid to regular police officers in such City or Town as required by General Laws, Chapter 149, Section 24B, as amended.

1.7. Claims and disputes pertaining to the classification of labor or wage determinations made by the Commission of Labor and Industries must be presented by appeal filed with the Department of Labor and Industries within three days from the date of the first advertisement of call for bids; in one manner provided by General Laws, Chapter 14, Section 27A.

1.8. The Contractor shall include with the Form For General Bid, signed and certified copies of Owner’s Instructions To Bidders For Affirmative Action Issues, Non-Collusion and State Tax Compliance Certificate, OSHA Training Certificate, and Undocumented Worker Certificate, included at the end of this Section, as set forth in the contract, Article XII, and hereby made a part of the Contract Documents.

ARTICLE 2 - MINIMUM WAGE RATES

2.1. The Contractor shall keep posted on the site of the Work a legible copy of the schedule of “Minimum Wage Rates and Health and Welfare Fund Contributions” attached thereto.

2.2. The rates listed are straight hourly rates. Apprentices employed pursuant to this determination of wage rates must be registered and approved by the State Apprenticeship Council. Wherever rates for journeymen or apprentices are not listed, and if any other labor is not included in this list, the Contractor shall insert the rates of all those employed on the work.

2.3. The Contractor must keep on file the wage rates and qualifications of all labor employed on this Project in order that they may be available for inspection by the Awarding Authority or the Architect.

Labor Standards of the Commonwealth
ARTICLE 3 – CITY OF NEW BEDFORD REQUIREMENTS

3.1 The Contractor shall complete and include with Section 00 30 00 – Form For General Bid the following documents included as part of Division 00 of the Contract Documents:

- City of New Bedford Instructions To Bidders For Affirmative Action Issues
- City of New Bedford Non-Collusion and State Tax Compliance Certificate
- City of New Bedford OSHA Compliance Certificate
- City of New Bedford Undocumented Worker Certificate

(MINIMUM WAGE RATES AND HEALTH AND WELFARE AND PENSION CONTRIBUTIONS FOLLOW)

END OF SECTION
PART 1 - GENERAL

1.01 RELATED DOCUMENTS
A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 1- General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK
A. The Work of this Section applies to all Work performed under the Contract.
B. Any discrepancies found in the Contract Documents after signing of the Owner-Contractor agreement must be brought to the attention of the Architect for resolution. The Architect will determine which document entry governs and his decision will be final. The Contractor will not be entitled to a change in the Contract Time or Contract Sum based on discrepancies found after signing of the Owner-Contractor agreement.
C. Should conflict be evident between Contract Documents or within any Contract Document, the Contractor is deemed to have estimated the more expensive method of doing the Work unless he shall have asked for, and obtained, a written decision prior to submittal of bid or price quote, as to which method or materials will be required. Should the Work proceed after the discovery of errors, conflict, or omission by the Contractor and clarification has not been received from the Architect, the Contractor will be held fully responsible for replacement or correction, as directed by the Architect, at the Contractor's expense.

1.03 RELATED WORK SPECIFIED ELSEWHERE
A. Carefully examine all the Contract Documents for requirements which effect the Work of this Section.
B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
   2. Section 02 41 13 – Selective Demolition
   3. DIVISION 03 – CONCRETE; including all Sections contained therein
   4. DIVISION 04 – MASONRY; including all Sections contained therein
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
   7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
   8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
   9. DIVISION 09 – FINISHES; including all Sections contained therein.
   10. Section 21 00 00 – Fire Suppression
   11. Section 22 00 00 – Plumbing
   12. Section 23 00 00 - HVAC
   13. Section 26 00 00 – Electrical
   14. DIVISION 31 – EARTHWORK; including all Sections contained therein
   15. Section 32 12 00 – Site Improvements

1.04 PROJECT IDENTIFICATION AND DESCRIPTION OF WORK
A. Project Identification: The name of the Project is “NEW BEDFORD POLICE STATION HEADQUARTERS – SALLY PORT ADDITION & PARKING LOT RESURFACE”. The Project site is located in New Bedford, Massachusetts.
B. Abbreviated Written Summary: The Work of the Contract can be summarized by reference to the Contract Documents. Work of this Contract includes the coordination of the entire Work indicated by the Contract Documents. Work of this Contract includes architectural and demolition Work which together provide a fully functioning facility in accordance with requirements of the Contract Documents. All items shown, indicated, or inferable from the Contract Documents are to be included such that there are no omissions which would prevent full use in all respects. Materials shown or indicated in any one Contract Document are to be inferred as if required by all. Work of the Contract is also unavoidably affected or influenced by governing regulations, natural phenomenon including weather conditions, and other forces outside the Contract Documents. Briefly, without limitation the Work can be summarized as follows:

1. The Project consists of addition to New Bedford Police Station in New Bedford

C. Examination of Site and Documents:

1. All Bidders are required to visit the site and examine all Contract Documents before submitting a bid. Inspect and be thoroughly familiar with the same and conditions under which the Work will be carried out. Neither the Owner nor the Architect will be responsible for errors, omissions and/or charges for extra Work arising from Contractor's failure to familiarize themselves with the Contract Documents or existing site and conditions. By submitting a Bid, the Bidder agrees and warrants that he had the opportunity to examine the building site and the Contract Documents, that he is familiar with the conditions and requirements of both and where they require, in any part of the Work, a given result to be produced, that the Contract Documents are adequate and that he will produce the required result.

2. The building site will be available for inspection as set forth in City of New Bedford Front End, Pre-Bid Conference/Site Inspection

1.05 SPECIFICATION INFORMATION

A. These specifications are a special form of technical writing edited from master specifications and contain deviations from traditional writing formats. Capitalization, underlining and bold print is only used to assist reader in finding information and no other meaning will be implied.

B. Except where specifically indicated otherwise, the subject of all imperative statements is the Contractor.

C. Sections are generally numbered in conformance with Construction Specifications Institute Master Format System. Numbering sequence is not consecutive. Refer to Index of Specification Sections for names and numbers of Sections included in this Project.

D. Pages are numbered separately for each Section. Each Section is noted with “End of Section” to indicate when Section is complete.

1.06 DEFINITIONS

A. Owner: City of New Bedford, New Bedford, Massachusetts.

B. Provide: means furnish and install, complete with all necessary components and accessories, ready for intended use.

C. Indicated: is a reference to other portions of the Contract Documents.

D. Approved: Except where specifically stated otherwise, the words “approved”, “directed”, “requested”, “selected”, “accepted” mean “approved by the Architect”, “directed by the Architect” and so on. The words “approved” and “accepted” shall be held to the limitations stated in the General Conditions. In no case, shall “approval” or “acceptance” by the Architect be interpreted as a release of Contractor of his responsibilities to fulfill all the requirements of the Contract Documents. Where the Contract Documents require Contractor approval, approval must be submitted in writing using the word “approved” Contractor “review” only is not an acceptable substitute for Contractor approval.

E. Observe/Observation: Except as otherwise defined in greater detail, the Architect's observation of the Work will be held to the limitations stated in the General Conditions and the Owner/Architect agreement. In no case, shall observation by the Architect be interpreted as a release of Contractor of his responsibilities to fulfill all the requirements of the Contract Documents. Observe shall be defined in accordance with the General Conditions of the Contract to include only visiting the site periodically, observing the condition and progress of the Work, and reporting to the Owner.
F. Furnish: Except as otherwise defined in greater detail, furnish means supply, including shop fabrication if applicable, and deliver to project site, ready for unloading, unpacking, assembly, installation and the like as applicable in each instance.

G. Install: Except as otherwise defined in greater detail, install means operations at project site including, but not limited to, unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, placing in service and similar operations as applicable in each instance.

H. Installer: The person or firm engaged by Contractor or Subcontractor for performance of a specific unit of installation Work at the project site. It is a general requirement that Installers be expert and experienced in the Work they are engaged to perform.

I. Day: Except as otherwise defined in Owner-Contractor Agreement, day means calendar day.

J. Public: Any person in the building other than those attending to central mechanical, electrical, and plumbing services.

K. Public Areas: All areas other than rooms dedicated solely to central mechanical, electrical, and plumbing equipment.

L. Back-of-House Areas: Rooms not designated as part of a public area.

M. Continuation of Material: Where a given material is indicated on any of the Drawings, it is intended that such material be used throughout the length and height of walls, partitions, spandrels, panels, windows, lights, areas, etc., or in the assembly detail in which it occurs, for other similar locations throughout the building, unless a different material is specifically indicated.

1.07 INDUSTRY STANDARDS

A. Referenced standards are part of the Contract Documents and have the same force and effect as if bound with these specifications.

B. Except where specifically indicated otherwise, comply with the current standard in effect as of the date of the Owner/Contractor Agreement.

C. Obtain copies of industry standards directly from publisher.

D. The titles of industry standard organizations are commonly abbreviated; full titles may be found in Encyclopedia of Associations or consult Architect.

E. Where Workmanship is governed by a referenced standard, submit one copy to Architect and additional copies to fabricators, installers, and others involved in the performance of the Work.

1.08 CONTRACTOR USE OF PREMISES

A. The Contractor may be allowed to use a limited portion of the existing building for field offices and/or storage areas at the discretion of the Owner. Temporary office and storage space shall be provided by the Contractor in accordance with requirements of Section 01 50 00 - Temporary Facilities and Controls. Owner approval will be required for all temporary office facilities and storage areas, including their size and location.

B. The Contractor shall submit a Site Utilization Plan for approval prior to commencing the Work of this Contract. The plan shall include, but not be limited to, proposed locations for Contractor and Subcontractor laydown and/or material storage areas, field offices, and site access.

1.09 USER OCCUPANCY

A. The existing site will be occupied during the Work of this Contract. Work required to be performed in areas occupied for summer programs, as indicated on the Drawings, shall be performed before or after program hours, or on weekends, at no additional cost to the Owner.
1.10 PERMITS, INSPECTION AND TESTING REQUIRED BY GOVERNING AUTHORITIES

A. If the Contract Documents, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any portion of the Work to be inspected, tested or approved, the Contractor shall give the Architect and such Authority timely notice of its readiness so that the Architect may observe such inspection and testing.

B. Prior to the start of construction, the Contractor shall complete application to the applicable Building Code enforcement authority for the building permits. Such Permits shall be displayed in a conspicuous location at the project sites. Fees for Building, Electrical, Plumbing, Fire Protection, and Mechanical Permits will be paid in accordance with the City of New Bedford Building Department Permit Fee Schedule included as Appendix A at the end of this Section.

1. Application for Building Permit shall include the following Documents:
   b. Narrative Report for compliance with 780 CMR, 1301.8.4

C. Submit copies of all permits, licenses, certifications, inspection reports, releases, notices, judgements, and communications from authorities having jurisdiction.

1.11 CONSTRUCTION SCHEDULES

A. Within 14 days after signing the Owner/Contractor Agreement, provide the following for the Project:
   1. A comprehensive bar chart schedule showing all major and critical minor portions of the Work, sequence of Work and duration of each activity. Update and reissue regularly.
   2. Progress schedule indicating Substantial Completion within the specified Contract Time
   3. Critical path chart indicating the interrelationships of critical and non-critical events required to complete the Project on the dates established. The Contractor will be required to use “Primvera/P-3” CPM scheduling software.
   4. Update all schedules and distribute monthly.
   5. Other required schedules, including but not limited to, Submittals and Testing.

B. Provide all schedules in accordance with requirements of Section 01 51 11 – Progress Schedule.

1.12 SCHEDULE OF VALUES

A. Prepare Schedule of Values to coordinate with application for payment breakdown. The Schedule of Values shall be broken down into labor and materials for each Work activity with increments no greater than $50,000.00. Submit at least 10 days before first payment application. Update and reissue regularly. The CPM shall be tied into and reflect the Schedule of Values.

1.13 PAYMENT REQUESTS

A. Provide three copies of each request in a complete filled out copies of AIA G702 and continuation sheet G703. Substantiate requests with complete documentation; include change orders to date. Provide partial lien waivers for Work in progress and full lien waivers for completed Work. Contractor shall be required by Law to submit payroll records substantiating payment of wage rates to employees on a weekly basis.

B. Before first payment application, provide the following:
   1. List of Subcontractors, suppliers and fabricators
   2. Schedule of Values
   3. Progress Schedule
   4. Submittal Schedule keyed to project schedule
   5. List of Contractor's key project personnel
   6. Copies of permits and other communications from authorities
   7. Contractor's Certificate of Insurance
   8. Performance and Payment Bonds
   9. Unit Price Schedule
   10. Contractor's complete submittal log
   11. Contractor's complete submittal schedule
C. Before final payment application, provide and complete the following:
   1. Complete closeout requirements
   2. Complete punch list items
   3. Settle all claims
   4. Transmit Record Documents to Architect
   5. Prove that all taxes, fees and similar obligations have been paid
   6. Remove of temporary facilities and surplus materials
   7. Change lock cylinders or cores
   8. Clean the Work
   9. Submit Consent of Surety for final payment.

1.14 PROCEDURES & CONTROLS

A. Preconstruction Conference: Require representatives of all major Subcontractors and suppliers to attend; notify Owner and Architect at least 72 hours in advance.

B. Progress Meetings: Hold regular weekly meetings with Owner and Architect, and meetings before preparation of payment requests. The Contractor shall be represented by a principal, project manager, general superintendent or other authorized main office representative, as well as by his own superintendent. An authorized representative of any Subcontractor or Subcontractors shall attend such meetings if his presence is requested by the Architect. Such representatives shall be empowered to make binding commitments on all matters to be discussed at such meetings, including costs, payments, change orders, time schedules and manpower. Any notices required under the Contract may be served on such representatives.
   1. As a prerequisite for monthly payments, ordering schedules, shop drawing schedule, and coordination meeting schedules shall be prepared and maintained by the Contractor and shall be reviewed and updated in a monthly basis, and a copy shall be submitted to the Owner's Representative and Architect.
   2. To expedite construction progress on this project, the Contractor shall order all materials immediately after the approval of shop drawings and shall obtain a fixed date of delivery to the project site for all materials ordered which shall not impede or otherwise interfere with construction progress.
   3. Scheduling shall be discussed with all concerned parties, and methods shall be presented by the Contractor which shall reflect construction completion not being deferred, at no additional expense to the Owner.
   4. Project meetings shall be chaired by the Architect.
   5. Project Meeting Notes: The Contractor shall be responsible for recording meeting minutes at each project meeting. The minutes shall incorporate the substance of all issues discussed, noting date of entry of each issue, the resolution, the party responsible for issue resolution, and the date of resolution. The meeting minutes will be distributed to all attendees and responsible parties at the next scheduled project meeting.

C. Daily Reports: Prepare daily reports recording all important information concerning events at the site for each project site. Submit to Architect weekly. Minimum required information contained in the daily report will be:
   1. Manpower by trade
   2. Work activity by trade
   3. Equipment by trade
   4. Material deliveries by trade
   5. Weather conditions
   6. All safety violations and accidents
   7. Inspections if any

D. Layout: Layout Work and be responsible for all lines, elevations, and measurements of the building, grading, utilities and other Work executed under the Contract.

E. Project Limit Line: The boundaries of the site do not limit the responsibility of the Contractor to perform the Work in its entirety. Make utility connections as indicated. The Contractor's superintendent must be present at each of the sites whenever any Work is being performed.

F. Matching: Where matching is indicated, the Architect shall be the sole and final judge of what is an acceptable match.
G. Observation: Notify the Architect and authorities having jurisdiction at least thirty-six hours in advance of concealing any Work.

H. Utilities: Prior to interrupting utilities, services or facilities, notify the utility owners and obtain their written approval.

I. Furnishings, Fixtures, and Equipment: Cooperate and permit the Owner to install his furnishings and equipment during the progress of the Work. Owner's installation of furnishings or equipment does not signify Owner's acceptance of any portion of the Work.

J. Clean-Up: Clean-up all waste at least once a week, remove from site regularly, and legally dispose of off-site.

K. Installer's Acceptance of Conditions: All installers shall inspect substrates and conditions under which Work is to be executed and shall report in writing to the Contractor all conditions detrimental to the proper execution and completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected. Beginning Work means installer accepts previous Work and conditions.

L. Documentation: The Contractor shall be responsible for providing and maintaining filing, reporting, Submittals, RFI's, Payment Requisitions, Schedules, Change Proposals, Change Orders, and the like for the project.

M. Management and Financial Records: Management and financial records shall be maintained by the Contractor pursuant to M.G.L. c 30 § 39 R.

N. Provide noise and dust control procedures in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.

1.15 SPECIAL PROJECT CONDITIONS

A. The Contractor shall undertake every possible measure to prevent damage of any kind to any portion of existing surrounding properties or areas.

B. The Contractor is required to exercise all possible care in the conduct of any Work which would affect surrounding properties and occupied areas and to be aware of the potential for damage. The Contractor shall be prepared to stop any Work immediately which is deemed to cause deleterious affects to adjacent areas.

C. The Contractor shall be held responsible for any damage to surrounding properties and occupied areas resulting from his failure to exercise care during the course of construction.

1.16 PROTECTION OF EXISTING UTILITIES

A. The Contractor shall schedule, execute and pay all costs associated with implementation of all requirements related to disconnection or interruption of existing public or private utility services in accordance with requirements of local authorities having jurisdiction, including but not limited to the following:

1. City of New Bedford Police Department
2. City of New Bedford Fire Department
3. City of New Bedford Department of Public Works
4. City of New Bedford Water Department
5. Local Telephone Provider
6. Local Natural Gas Provider
7. Local Cable TV Provider
8. Dig Safe

B. Protect existing utilities which remain from damage due to construction operations. Identify locations of utilities with temporary markers.
C. The Contractor shall be responsible for determining locations of underground structures and utilities, including but not limited to: water, sewer, gas, electric, telephone, and cable TV. Utility services to adjacent buildings shall be maintained without interruption, unless otherwise authorized in writing by the Architect. Utilities located in public ways surrounding the Project site shall be protected from damage related to the Work of this Section. All costs related to repair or replacement of damage to existing utilities not called for to be altered under the Work of this Contract shall be paid by the Contractor. No excavation in a public street or way, or in any public or private place, shall take place prior to verification of the location of all underground utilities by DIG SAFE.

D. Place markers to indicate locations of disconnected services and identify service lines and capping locations on Project Record Documents.

1.17 WARRANTIES

A. The Work of this Contract, including Substantial Completion, will be completed in two (2) Phases. The Contractor shall be responsible for providing full manufacturer warranties in accordance with requirements of individual trade Sections for specific product warranty requirements. Because of overlapping nature of the required construction Phases, the Contractor shall be responsible for providing manufacturer warranties, the Effective Starting Date of which, shall commence upon Substantial Completion of the respective Phase of the Work of the Contract, as described in the Contract Documents, and shall run for the warranty period indicated in the respective trade Section.

B. Procurement: Where a warranty is required, do not purchase or subcontract for materials or Work until it has been determined that parties required to countersign warranties are willing to do so.

C. Warranty Forms: Submit written warranty to Owner through Architect for approval prior to execution. Furnish 2 copies of executed warranty to Owner for his records; furnish 2 additional conformed copies where required for maintenance manual.

D. Work Covered: Contractor shall remove and replace other Work of project which has been damaged as a result of failure of warranted Work or equipment, or which must be removed and replaced to provide access to Work under warranty. Unless otherwise specified, warranty shall cover full cost of replacement or repair, and shall not be pro-rated on basis of useful service life.

E. Warranty Extensions: Work repaired or replaced under warranty shall be warranted until the original warranty expiration date or for ninety days whichever is later in time.

1.18 DELIVERY, STORAGE, HANDLING, & INSTALLATION CONDITIONS

A. Manufacturer's Instructions: Strictly comply with manufacturer's instructions and recommendations and prevent damage, deterioration and loss, including theft.

B. Minimize long-term storage of products at the site. Maintain environmental conditions, temperature, ventilation, and humidity within range permitted by manufacturers of materials and products used.

1.19 LABELS

A. Labels, Trademarks, & Trade Names: Locate required labels on inconspicuous surfaces (not typically visible to the public). No manufacturer labels, nameplates, trademarks, or other identifying markings shall be located on surfaces visible to the public. Any such markings shall be removed and damage repaired, or item replaced, at the discretion of the Architect. Provide permanent data plate on each item of mechanical equipment stating manufacturer, model, serial number, capacity, ratings and all other essential data.

1.20 MUNICIPAL POLICE SERVICES

A. The Contractor shall make all necessary arrangements with the City of New Bedford Police Department in advance of times when regular off-duty, or reserve, police officers will be needed for traffic control protection, due to operations performed under this Contract. Officers shall be compensated, by the Contractor, in accordance with City of New Bedford wage rates for such services. Extend the Workman’s compensation Insurance and Employer’s Liability Insurance, required under the General Contract, to cover police used on the project.
1.21 WELDING, CUTTING, AND BURNING PROCEDURES

A. PURPOSE

1. The purpose of this procedure is to provide minimum standards to prevent loss of life and property from fire during welding, cutting or burning processes involving the use of oxygen-fuel gas and electric arc cutting and welding equipment.

B. GENERAL REQUIREMENTS

1. In the performance of welding, cutting and burning operations, only approved equipment shall be used and the equipment shall be installed and operated in accordance with OSHA standards, the manufacturer's instructions, and nationally recognized good practice.

2. A "Hot Work" permit for welding, cutting, burning or spark producing operations shall not be issued unless the individual in charge of performing such operations is deemed capable of doing such work in a safe manner by the Contractor's Safety Representative. Demonstration of knowledge of fire safety requirements and this welding and cutting procedure in addition to the equipment manufacturer's operational instructions shall constitute acceptable evidence of compliance.

3. A fire watch shall be provided by the Contractor or the Filed-Subcontractor's for their respective work to safeguard against the ignition of any material by the welding, cutting or burning operation, to make use of portable fire extinguishers or fire hose and to perform similar fire prevention and fire protection duties. The fire watch shall remain on the job at least 30 minutes after the "hot-work" including but not limited to welding or cutting operations have been completed to ensure that no fire exists. A signed inspection report attesting to that fact shall be filed and available for inspection by the local Fire Department.

4. A record shall be maintained by the responsible Contractor and Filed-Subcontractor Safety Representative of all locations where welding or cutting operations are performed. The record shall state the name of the assigned fire watch or watches and the length of time for which the fire watch standby was continued after work was completed (a minimum of 30 minutes). It shall include the date, time, and specific location at which work was done and describe the work, fire protection provided, and special precautions taken. Individual job authorizations shall be kept available always for inspection by the local Fire Department or the Owner's Representative. The assigned fire watch or fire watches shall sign the work authorization attesting to the fact that no fire existed after the work ceased and the standby period had passed.

5. Where welding, cutting or burning is done near walls, partitions, ceiling or roof of combustible construction, fire resistant shields or guards shall be provided to prevent ignition. When welding, cutting or burning is to be done on a metal wall, partition, ceiling, or roof, precautions shall be taken to prevent ignition of combustibles on the other side due to conduction of radiation. A fire watch shall be required on the other side of the exposed wall, partition, ceiling or roof if there is any danger of the welding, cutting or burning on one side to result in ignition of materials or structure on the unexposed side. Welding, cutting or burning shall not be attempted on a metal partition wall or on partitions of combustible sandwich-type panel construction.

C. FIRE SAFETY REQUIREMENTS

1. Cutting or welding operations shall be performed only in areas that have been protected against the ignition and spread of fire.

2. Within the confines of a Contractor and Filed-Subcontractor's work area welding, cutting or burning shall be done in specific areas designed and approved for such work as a maintenance shop, an outside location or a detached structure which shall be of noncombustible or fire resistive construction.

3. When work cannot be moved as in most construction or structural modification activity, the area shall be made fire safe by removing all combustible material within distance of 35 feet and all combustible material from beneath the location where welding, cutting or burning is to be performed.

4. When work cannot be relocated and combustible material cannot be feasibly relocated, all combustible material exposed within 35 feet horizontally or beneath the welding, cutting or burning operation or within 35 feet of exposed floor, ceiling or wall openings shall meet the following requirements:

   a. Such combustible construction or material shall be protected from possible sparks, hot metal or oxidized by fire resistive shields or noncombustible covers as required by the Massport Fire Rescue Department.
b. Such floor, ceiling or wall openings shall be protected by fire resistive shields and openings or cracks in walls, floors or ducts shall be tightly covered to prevent the passage of sparks or slag to adjacent areas.

5. At least one portable fire extinguisher having a rating of not less than 4-A:60-B:C shall be kept at the location where welding, cutting or burning is done and at least one portable fire extinguisher having a rating of not less than 2-A:10-B:C shall be attached to all portable welding carts.

6. Welding, cutting or burning shall not be done in or near rooms or locations where flammable gases, liquids or vapors, lint dust or loose combustible stocks are present when sparks or hot metal from the welding, cutting or burning operations may cause ignition or explosion of such materials.

7. Welding, cutting or burning shall not be performed in the presence of explosive atmospheres or on containers, equipment or in hollow spaces or cavities which contain or have contained flammable fluids, gases or solids until these containers or equipment have been thoroughly cleaned, inverted or purged.

8. Sprinkler protection shall not be shut off while welding, cutting or burning work is being performed. When welding, cutting or burning work is being done close to automatic sprinkler heads, noncombustible board products or damp cloth guards shall be used to shield the individual heads, but shall be removed when the work is completed.

9. Where a sprinkler system will be impaired or rendered inoperative for any reason, this shall be noted in the application for permit so that all necessary precautions may be taken as required by the local Fire Department.

10. Hot tapping of other welding, cutting or burning on a flammable gas or liquid transmission or distribution utility pipeline shall be qualified to perform such work.

PART 2 - PRODUCTS  NOT USED

PART 3 - EXECUTION  NOT USED

END OF SECTION
SECTION 01 26 00

CONTRACT MODIFICATION PROCEDURES

PART I - GENERAL

1.01 RELATED DOCUMENTS
A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 1 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK
A. The Work of this Section shall include, but not be limited to, the following:
   1. Administrative and procedural requirements for handling and processing Contract modifications.

1.03 RELATED WORK SPECIFIED ELSEWHERE
A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.
B. Other Specifications Sections which directly relate to the Work of this Section include, but are not limited to, the following:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
   2. Section 02 41 13 – Selective Demolition
   3. DIVISION 03 – CONCRETE; including all Sections contained therein
   4. DIVISION 04 – MASONRY; including all Sections contained therein
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
   7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
   8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
   9. DIVISION 09 – FINISHES; including all Sections contained therein.
   10. Section 21 00 00 – Fire Suppression
   11. Section 22 00 00 – Plumbing
   12. Section 23 00 00 - HVAC
   13. Section 26 00 00 – Electrical
   14. DIVISION 31 – EARTHWORK; including all Sections contained therein
   15. Section 32 12 00 – Site Improvements

1.04 MINOR CHANGES IN THE WORK
A. Supplemental instructions authorizing minor changes to the Work, not involving an adjustment to the Contract Sum or Contract Time, will be issued by the Architect on AIA form G710, Architects Supplemental Instructions.

1.05 CHANGE ORDER PROPOSAL REQUESTS
A. Prior to issuing instructions for changes in the Work which the Architect judges will require adjustment to the Contract Sum or Contract Time, the Architect may, at its discretion, request the Contractor to prepare an estimate of the amount of the adjustment.
B. Owner-Initiated Proposal Requests: The Architect will issue a detailed description of the proposed change and supplemental or revised Drawings and Specifications.
   1. Respond to the request by submitting a proposal to the Architect for the Owner’s review within 21 calendar days of receipt of the proposal request, unless a shorter period for response is indicated in the proposal request.
2. Include in the proposal, an estimate of cost necessary to execute the proposed change and a statement indicating the effect the proposed change, in the Work will have on the Contract time. Include the supporting data listed in paragraph F, below.

3. Proposal requests are not an instruction either to stop Work in progress, or to execute the proposed change. Continue with Work in progress that is not affected by the proposed change.

C. Contractor-Initiated Change Order Requests: When latent or other unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Architect.

1. Notify the Architect in writing of proposed changes within 21 calendar days after the occurrence of the event of observance of the condition giving rise to the change proposal request.

2. Submit the change-order proposal request within 21 calendar days after delivering such notification to the Architect.

3. Include a statement outlining the masons for the charge and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and Contract Time. Include the supporting data listed in paragraph F, below.

4. Comply with requirements in Section "Product Substitutions" if the proposed change in the Work requires the substitution of one product or system for a product or system specified.

D. No extensions of Contract Time nor increase in the Contract Sum will be considered if the additional time or additional cost is a consequence of the Contractor's failure to submit an estimate within the time stipulated, regardless of whether the proposal request or change order request was initiated by the Owner or the Contractor.


1.06 CHANGE ORDERS

A. The following requirements shall apply to both Owner-initiated proposal requests and Contractor-initiated Change Order request.

1. Submit a complete and accurate Price to the Architect and the Construction Manager for review. Incomplete proposals will be returned to the Contractor without review, and shall be completed by the Contractor and returned to the Architect and the Construction Manager within the same time: period specified above for submittal of proposals; there shall be no extension of time for such re-submittals.

2. The Architect and the Construction Manager will review and act on the Contractor's Proposal within 21 days of receipt. The Architect's review, at the Architects discretion, may include consideration of Costs listed in Means "Construction Cost Data" or a similar data base, and/or on conversations with local manufacturers and suppliers.

3. Include applicable taxes, delivery charges, equipment rental, and amounts of trade, discounts.

4. Itemize Work which is to be performed by employees of the Contractor.

5. For Work which is not to be performed by employees of the Contractor, submit pricing on the letterhead of the proposed Subcontractor, fabricator or supplier.

6. Itemize General Conditions Work included in the proposed cost of the change; a lump sum or percentage of the cost will not be accepted.

7. Prices shall remain valid for a minimum of 90 days from the date of the initial pricing approval to execution of the Change Order by the Owner.

B. Consideration and Acceptance of Price Proposal: The following procedures shall apply to both Owner-Initiated proposal requests and Contractor-initiated Change Order requests:

1. Submit a complete and accurate Price to the Architect for review. Incomplete proposals will be returned to the Contractor without review, and shall be completed by the Contractor and returned to the Architect within the same time: period specified above for submittal of proposals; there shall be no extension of time for such re-submittals.

2. The Architect will review and act on the Contractor's Proposal within 21 days of receipt. The Architect's review, at the Architects discretion, may include consideration of Costs listed in Means "Construction Cost Data" or a similar database, and/or on conversations with local manufacturers and suppliers.
3. Within 10 calendar days after receipt of the Architect’s comments, make changes to the cost proposal in response to the Architect’s comments and resubmit for approval.
4. The Architect will promptly notify the Contractor whether the pricing is accepted or will direct the Contractor to make additional changes.
5. When the Contractor’s proposal is approved by the Architect the Architect will prepare a Change Order for execution by the Owner, the Architect and the Contractor.

1.07 CONSTRUCTION CHANGE DIRECTIVE
A. Construction Change Directive: When the Owner and Contractor are not in total agreement on the terms of a Change Order Proposal, the Architect may issue a Construction Change Directive on AIA Form G714, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
1. The Construction Change Directive will contain a description of the change in the Work and designate the method to be followed to determine change in the Contract Sum or Contract Time, in accordance with Article 7.3 of the General Conditions.
B. Documentation: If the Construction Change Directive is for Work which is to be compensated on the basis of Time and Materials, the Contractor shall maintain detailed daily records, verified with the Architect and Owner’s Project Manager, on a time and material basis of Work required by the Construction Change Directive.
1. After completion of the change, the Contractor shall submit an itemized account, including supporting data, as may be required by the Architect and Construction Manager, to substantiate cost and time adjustments to the Contract.

1.08 CHANGE ORDER PROCEDURES
A. Upon the Owner’s approval of a Change Order Proposal Request, the Architect will issue a Change Order for signatures of the Owner and Contractor on AIA Form G701, as provided in the Conditions of the Contract.
B. The Contractor shall promptly execute the Change Order.
C. The Architect will present the Change Order to the Owner’s Project Manager for review and approval. Upon Owner PM approval, the Change Order will then be forwarded by the Architect to the City of New Bedford DFFM Department for approval during its next regularly scheduled meeting subsequent to the date of the Change Order. A copy of the fully approved and executed Change Order will then be forwarded to all parties for the record.

1.09 PRE-INSTALLATION MEETING
A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION NOT USED

END OF SECTION
PART I - GENERAL

1.01 RELATED DOCUMENTS
   A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 1 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK
   A. The Work of this Section includes, but is not limited to, the following:
      1. Administrative and supervisory requirements necessary for Project coordination
      2. Request for Information (RFI’s)
      3. Coordination of the work and coordination among separate contractors
      4. Administrative and Supervisory personnel
      5. Project meetings
      6. Field measurements

1.03 RELATED WORK SPECIFIED ELSEWHERE
   A. Carefully examine all the Contract Documents for requirements which effect the Work of this Section.
   B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
      1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
      2. Section 02 41 13 – Selective Demolition
      3. DIVISION 03 – CONCRETE; including all Sections contained therein
      4. DIVISION 04 – MASONRY; including all Sections contained therein
      5. DIVISION 05 – METALS; including all Sections contained therein.
      6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
      7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
      8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
      9. DIVISION 09 – FINISHES; including all Sections contained therein.
      10. Section 21 00 00 – Fire Suppression
      11. Section 22 00 00 – Plumbing
      12. Section 23 00 00 - HVAC
      13. Section 26 00 00 – Electrical
      14. DIVISION 31 – EARTHWORK; including all Sections contained therein
      15. Section 32 12 00 – Site Improvements

1.04 REQUESTS FOR INFORMATION
   A. Contractor's responsibility for review of Contract Documents is set forth in the General and Supplementary Conditions.
   B. Study the Contract Documents applicable to each component of the Work sufficiently in advance of the time such Work will be ordered, fabricated or installed, so that if additional information or instructions are needed, the Architect will have sufficient time to respond such requests before the information is needed by the Contractor; allow at least 15 calendar days for the Architect to respond.
C. When requesting additional Drawings, Specifications, or instructions, submit the request in writing and clearly state what information is required. Include a reference to the drawing sheet and detail number, and/or the specification Section and paragraph number requiring clarification, or give other similar precise information to direct the Architects attention to the matter and to show that the Contractor has made a conscientious effort to locate the information and understand the information presented in the Contract Documents. Requests for information not accompanied by a precise, detailed reference to the Contract Documents will be returned to the Contractor unanswered for revision. Requests for information regarding information which is clearly shown or stated in the Contract Documents, will be returned to the Contractor unanswered. By submitting Requests for Information, the Contractor represents that the Contractor has determined and verified materials, field measurements, and field construction criteria related thereto, or will do so, and has checked and coordinated the information contained within each Request for Information with the requirements of the Work and of the Contract Documents. By submitting Requests for Information, the Contractor further represents that the Contractor has reviewed each Request for Information as it relates to the rest of the Work and Contract Documents. The Architect's responses to the Contractor's Requests for Information shall not relieve the Contractor of the obligations of Paragraphs 3.3, 3.5, 3.12, and 4.2 of the General & Supplementary General Instructions.

1.05 COORDINATION

A. Coordination: Coordinate construction activities included under various Sections; of these Specifications to assure efficient and orderly installation of each part of the Work.

1. Schedule construction activities in the sequence required to obtain the best results. When best sequence cannot be achieved, make provisions to accommodate items scheduled for later installation.

2. Where space is tight, coordinate installation of different components to provide maximum accessibility for required maintenance, service and repair.

3. Coordinate construction activities under this Contract with separate contractors performing related work.

B. Where necessary, prepare memoranda outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings. Transmit to the Architect and distribute to all other parties involved.

1. Prepare similar memoranda for the Owner and separate Contractors where coordination of their Work is required.

C. Coordinate administrative activities with construction activities to avoid conflicts and ensure - orderly progress of the Work. Examples of administrative activities which must be carried out in a timely fashion to facilitate timely progress of the work include, but without limitation: preparation of schedules, delivery and processing of submittals, scheduling meetings,

D. Provide Coordination Drawings in accordance with requirements of Section 01 33 00 – Submittal Procedures. The Contractor shall provide the services of a designated on-site representative to oversee implementation of Work related to completion of information contained in the Coordination Drawings, in accordance with requirements of the Contract Documents.

1.06 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

A. Employ a competent superintendent, reasonably acceptable to the Owner, and necessary assistants. Require these supervisory personnel to be in-attendance at the project site full time during the progress of the work from the beginning of the Work, until the daft of Substantial Completion, and for such additional time thereafter as the Architect may determine to be necessary for the expeditious completion of the Work.

1. *"From the beginning of the Work" means before any temporary construction or sitework begins, including staking out the site, placing of erosion control devices, site clearing, or cutting of trees.

2. Provide the superintendent with a cellular phone or paging device, so that he or she can be reached at all times.

3. The Owner reserves the right to request replacement of the Contractor's Superintendent for just cause, in accordance with requirements of the Contract Documents.
B. Agency: The Contractor's superintendent shall attend the regularly scheduled project meetings and special project meetings as the Contractors agent, and shall be empowered to make: binding commitments on all matters to be discussed, including costs, payments, change orders, time schedules, and manpower. Notices required under the Contract may be served on the Contractor's superintendent.

1.07 PROJECT MEETINGS
A. Project Meetings: Project meetings are specified in Section 01 00 00 – General Requirements.
B. Subcontractor Progress Meetings: In addition to meetings called by the Owner or Architect, schedule and administer weekly subcontractor progress meetings.
   1. Special Meetings; Schedule and attend additional informational and problem solving meetings as required by progress of the work or requested by the Owner or the Architect to discuss non-routine issues. The Architect will prepare and distribute agenda, record and distribute the minutes.

1.08 REVIEW OF WORK BY SUBCONTRACTORS
A. Before permitting any subcontractor to begin work on the project site, meet with the subcontractor to review the work ahead. As a minimum, review the Contract Documents for work pertaining to that subcontractor; review the subcontractor's shop drawings, examine existing conditions affecting the work of the subcontractor, and review environmental and other project conditions for conformance to specified requirements,

1.09 FIELD MEASUREMENTS
A. Before beginning the Work, check and compare critical dimensions at the site with those shown on the Drawings, and immediately bring discrepancies to the attention of the Architect and request resolution.
B. As the work progresses, continue to check and compare dimensions at the site with those shown on the Drawings before ordering materials, in preparation for producing shop drawings, before beginning fabrication, before ordering materials, and before cutting and fitting materials at the site, and at other times as frequently as required to ensure that the work will be fabricated to the right size(s) and will fit together correctly in the field. If discrepancies between site dimensions and Drawings are detected, immediately notify the Architect in writing, describing the nature and extent of the discrepancy, and attaching sketches or annotated copies of the plans if necessary to make the observation clear.
C. Mark on shop drawings, prior to submission to the Architect relevant field dimensions and note conflicts with the submitted material.

1.10 SUBMITTALS
A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures, or as otherwise required for completion and transmittal of all documents in accordance with requirements of the Contract Documents.

1.11 PRE-INSTALLATION MEETING
A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION NOT USED

END OF SECTION
PART 1 - GENERAL

1.01 RELATED DOCUMENTS
   A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 1 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK
   A. The Work of this Section includes, but is not limited to, the following:
      1. Administrative and procedural requirements for submittal of Shop Drawings, Product Data, Samples, and other required submittals as called for in the Contract Documents.

1.03 RELATED WORK SPECIFIED ELSEWHERE
   A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.
   B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
      1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
      2. Section 02 41 13 – Selective Demolition
      3. DIVISION 03 – CONCRETE; including all Sections contained therein
      4. DIVISION 04 – MASONRY; including all Sections contained therein
      5. DIVISION 05 – METALS; including all Sections contained therein.
      6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
      7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
      8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
      9. DIVISION 09 – FINISHES; including all Sections contained therein.
      10. Section 21 00 00 – Suppression
      11. Section 22 00 00 – Plumbing
      12. Section 23 00 00 - HVAC
      13. Section 26 00 00 – Electrical
      14. DIVISION 31 – EARTHWORK; including all Sections contained therein
      15. Section 32 12 00 – Site Improvements

1.04 GENERAL REQUIREMENTS
   A. Electronic Submittal Procedures
      1. General Requirements
         a. Shop Drawings and Product Data submittals shall be transmitted to the Architect in electronic (PDF) format.
         b. The intent of electronic submittals is to expedite the construction process by reducing paperwork, improving information flow, and decreasing turnaround time.
         c. The electronic submittal process is not intended for submittal of color samples, color charts, or physical material samples.
      2. Submittal Procedures
         a. The Contractor may use any or all of the following options for submittal preparation:
            1) Subcontractors and suppliers provide PDF submittals to the Contractor.
Submittal Procedures

2) Subcontractors and suppliers provide paper submittals to the Contractor who electronically scans and converts to PDF format.
3) Subcontractors and suppliers provide paper submittals converted to PDF format.
   a. The Contractor shall review and apply electronic stamp certifying that the submittal complies with requirements of the Contract Documents, including verification of manufacturer and product, dimensions, and coordination of information required for integration into all related components of the Work.
   b. The Contractor is responsible for distribution of reviewed submittals to all subcontractors and suppliers.
   c. The Architect/Engineer will notify the Contractor by e-mail of completed review and will make review comments available.
   d. The Contractor is responsible for distribution of reviewed submittals to all subcontractors and suppliers.
   e. The Contractor shall submit paper copies of reviewed submittals at Project closeout in accordance with requirements of Section 01 77 00 – Contract Closeout Procedures, Section 01 78 39 – Project Record Documents.

B. Prior to submittal of any shop drawings, product data or samples the Contractor shall submit to the Architect for approval, within 15 business days after being awarded the Contract, a complete submittal log and a schedule of submissions of shop drawings and miscellaneous Work-related submittals which corresponds to the requirements of the CPM schedule and the General Contract. No Submittals will be processed prior to the receipt of such schedule for the project. The schedules shall indicate, by trade, the date by which final approval of each item must be obtained, and shall be revised as required by the conditions of the Work, subject to the Architect’s approval. The Architects review period, including those of his consultants, will not exceed 30 days from the established date of each submission of shop drawings, product data, and samples, plus the additional time, if any, for distribution by the Contractor and receipt of submissions by the Architect. The Contractor shall be required to strictly adhere to the dates established in the schedule. The information in this submittal schedule shall also be included in the Contractor’s CPM schedule for the project submitted in accordance with Section 01 51 11 - Progress Schedule.

C. Following approval of submittal log and schedule, submit to the Architect, shop drawings, product data and samples required by each specification Section.

D. When the phrase “By Others” (or similar expression) appears on a submittal and refers to any of the Contract Work, it shall be interpreted to mean “by the General Contractor or another Subcontractor”. The Architect’s review of any submittal containing such phrase shall not be considered permission to delete any Work from the Contract.

E. Review and approval of shop drawings by the Architect does not indicate approval of changes in the Contract, Time or Cost

1.05 SHOP DRAWINGS

A. Original drawings, prepared by The Contractor, Subcontractor, Supplier or distributor which illustrate some portion of the Work; showing fabrication, layout, setting or erection details.
   1. Prepare drawings in a clear and thorough manner.
   2. Identify details by reference to sheet and detail numbers shown on Contract Drawings.

1.06 PRODUCT DATA

A. Manufacturer’s standard schematic drawings:
   1. Modify drawings to delete information which is not applicable to project.
   2. Supplement standard information to provide additional information applicable to project.

B. Manufacturer’s catalog sheets, brochures, diagrams, schedules, performance charts, illustrations and other standard descriptive data.
   1. Clearly mark each copy to identify pertinent materials, products or models.
   2. Show dimensions and clearances required.
   3. Show performance characteristics and capacities.
   4. Show wiring diagrams and controls.
1.07 SAMPLES
A. Physical examples to illustrate materials, products, units of Work, equipment or Workmanship, and to establish standards by which completed Work is to be judged.
   1. Office samples: Of sufficient size and quality to clearly illustrate:
      a. Functional characteristics of product or material, with integrally related parts and attachment devices.
      b. Full range of color.

1.08 CONTRACTOR RESPONSIBILITIES
A. Review Shop Drawings, Project Data and Samples prior to submission.
B. Verify:
   1. Field measurements
   2. Field construction criteria
   3. Catalog numbers and similar data
C. Coordinate each submittal with requirements of Work and of Contract Documents.
D. Contractor's responsibility for errors and omissions in submittals is not relieved by Architect review of submittals.
E. Contractor's responsibility for deviation in submittals is not relieved by Architect review of submittals, unless the Architect gives written acceptance of specific deviations.
F. Notify Architect/Engineer, in writing at time of submission, of deviations in submittals from requirements of Contract Documents.
G. Furnish miscellaneous submittals (non-administrative) including, but not limited to warranties, maintenance agreements, Workmanship bonds, project photographs, survey data and reports, physical Work records, quality testing and certifying reports, copies of industry standards, record Documents, field measurement data, operating and maintenance materials, overrun stock, and similar information, devices and materials applicable to the Work.

1.09 SUBMISSION REQUIREMENTS
A. Schedule submissions to permit time for review and resubmission.
B. Submit number of Samples specified in each of specification Sections.
C. Accompany submittals with transmittal letter, in duplicate, containing:
   1. Date
   2. Project title and number
   3. Contractor's name and address
   4. Specification Section number, paragraph and item number
   5. The number of each Shop Drawing, Product Datum and Sample submitted
   6. Notification of deviations from Contract Documents
   7. Manufacturer's name or source of supply
   8. Trade name
   9. Catalog number
   10. Contractor's certification that he has checked all samples for compliance with Contract requirements and availability of material
   11. Name and address of Architect, Subcontractor, and supplier
   12. Other pertinent data
D. Submittals shall include:
   1. Date and revision dates
   2. Project title and number
   3. The names of:
      a. Architect
      b. Contractor
Submittal Procedures

01 33 00 - 4
F. Return of Submittals To Contractor Unchecked:
   1. The Architect may return submittals to the Contractor unchecked for any of the following reasons, in which case the submission will not be considered official:
      a. Submittal in violation of specified procedure or product
      b. Inadequately checked by Contractor
      c. Inaccurate and in substantial error

1.11 RESUBMISSION REQUIREMENTS
A. Shop Drawings:
   1. Revise initial drawings as required and resubmit as specified for initial submittal.
   2. Indicate on drawings any changes which have been made other than those requested by Architect/Engineer.
B. Product Data and Samples: Submit new data and samples as required for initial submittal.

1.12 DISTRIBUTION OF SUBMITTALS AFTER REVIEW
A. Distribute copies of Shop Drawings and Product Data which carry Architect/Engineer’s stamp, to:
   1. Contractor's Job site file
   2. Record Documents file
   3. Subcontractors and/or suppliers
   4. Owner
   5. Testing Agency (where applicable)
B. Distribute samples as directed.

1.13 ARCHITECT/ENGINEER’S DUTIES
A. Review submittals with reasonable promptness.
B. Review for:
   1. Design concept of project
   2. Information given in Contract Documents
C. Review of separate item does not constitute review of an assembly in which item functions.
D. Affix stamp and initials or signature certifying to review of submittal.
E. Return submittals to Contractor for distribution.

1.14 DAILY CONSTRUCTION REPORTS
A. Prepare daily construction reports, recording the following information concerning events at the site and submit copies to the Architect at weekly intervals.
   1. List of Subcontractors at the site
   2. Approximate count of personnel at the site
   3. High/low temperatures, general weather conditions
   4. Accidents and unusual events
   5. Meeting and significant events
   6. Stoppages and delays, shortages, losses
   7. Meter readings and similar recordings
   8. Emergency procedures
   9. Orders and requests of governing authorities
   10. Job modifications received and implemented
   11. Services connected, disconnected
   12. Equipment or system tests and start-ups
   13. Partial completion, occupancies
14. Substantial completion authorization

1.15 EMERGENCY ADDRESSES
A. Within 15 days of Notice to Proceed, submit to the Owner and the Architect, in writing, the name, addresses and telephone numbers of key members of their organization including Superintendent and personnel at the site, to be contacted in the event of emergencies at the building site, which may occur during non-Working hours.

1.16 PRE-INSTALLATION MEETING
A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 - PRODUCTS

2.01 SUBSTITUTIONS
A. Contractor's request for changes in products, materials and methods of construction required by Contract Documents are considered requests for "substitutions" and are subject to requirements specified under Section 01 60 00 – Product Requirements.

PART 3 - EXECUTION NOT USED

END OF SECTION
PART 1 - GENERAL

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

1.02 DESCRIPTION OF WORK
   A. The Work of this Section includes, but is not limited to, the following:
      1. Administrative and procedural requirements for quality assurance and quality control.
      2. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with requirements of the Contract Document.
         a. Specific quality-assurance and control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
         b. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and control procedures that facilitate compliance with requirements of the Contract Documents.
         c. Requirements for Contractor to provide quality assurance and control services required by the Owner, Architect, or authorities having jurisdiction are not limited by provisions of this Section.
         d. Specific test and inspection requirements are not specified in this Section.

1.03 RELATED WORK SPECIFIED ELSEWHERE
   A. Carefully examine all the Contract Documents for requirements which effect the Work of this Section.
   B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
      1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
      2. Section 02 41 13 – Selective Demolition
      3. DIVISION 03 – CONCRETE; including all Sections contained therein
      4. DIVISION 04 – MASONRY; including all Sections contained therein
      5. DIVISION 05 – METALS; including all Sections contained therein.
      6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
      7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
      8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
      9. DIVISION 09 – FINISHES; including all Sections contained therein.
      10. Section 21 00 00 – Fire Suppression
      11. Section 22 00 00 – Plumbing
      12. Section 23 00 00 - HVAC
      13. Section 26 00 00 – Electrical
      14. DIVISION 31 – EARTHWORK; including all Sections contained therein
      15. Section 32 12 00 – Site Improvements

1.04 DEFINITIONS
   A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
B. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

C. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

D. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

E. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

F. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

G. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trades.

1.05 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.06 REPORTS AND DOCUMENTS

A. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
   1. Name, address, and telephone number of technical representative making report.
   2. Statement on condition of substrates and their acceptability for installation of product.
   3. Statement that products at Project site comply with requirements.
   4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
   5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
   6. Statement whether conditions, products, and installation will affect warranty.
   7. Other required items indicated in individual Specification Sections.

B. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.07 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. 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 installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

G. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.08 QUALITY CONTROL

A. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 33 00 "Submittal Procedures."

B. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

C. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.

1. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
   a. Access to the Work.
   b. Incidental labor and facilities necessary to facilitate tests and inspections
   c. Adequate quantities of representative samples of materials that require testing and inspecting.
   d. Assist agency in obtaining samples.
   e. Facilities for storage and field curing of test samples.
   f. Delivery of samples to testing agencies as required
   g. Preliminary design mix proposed for use for material mixes that require control by testing agency. Security and protection for samples and for testing and inspecting equipment at Project site.
   h. Security and protection for samples and for testing and inspecting equipment at Project site.

2. Coordination: Coordinate sequence of activities to accommodate required quality assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
   a. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.09 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures, or as otherwise required for completion and transmittal of all documents required in accordance with requirements of the Contract Documents.
1.10 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
   1. Date test or inspection was conducted.
   2. Description of the Work tested or inspected.
   3. Date test or inspection results were transmitted to Architect.
   4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.02 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
   1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 51 00 – Cutting and Patching.
   2. Protect construction exposed by or for quality-control service activities.
   3. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION
SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART I - GENERAL

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

1.02 DESCRIPTION OF WORK
   A. Provide, maintain, remove, and pay all costs related thereto, all temporary facilities included under the Work of this Section, or as otherwise required for progress and completion of the Work in accordance with requirements of the Contract Documents.
   B. Coordinating and scheduling among all trades and Subcontractors, the furnishing and use of all temporary facilities for the Work in accordance with all Federal, State, and local governing rules and regulations.

1.03 RELATED WORK SPECIFIED ELSEWHERE
   A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.
   B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
      1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
      2. Section 02 41 13 – Selective Demolition
      3. DIVISION 03 – CONCRETE; including all Sections contained therein
      4. DIVISION 04 – MASONRY; including all Sections contained therein
      5. DIVISION 05 – METALS; including all Sections contained therein.
      6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
      7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
      8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
      9. DIVISION 09 – FINISHES; including all Sections contained therein.
      10. Section 21 00 00 – Fire Suppression
      11. Section 22 00 00 – Plumbing
      12. Section 23 00 00 - HVAC
      13. Section 26 00 00 – Electrical
      14. DIVISION 31 – EARTHWORK; including all Sections contained therein
      15. Section 32 12 00 – Site Improvements
   C. Nothing in this Section is intended to limit types and amounts of temporary Work required, and no omission from this Section shall be recognized as an indication by the Architect that such temporary activity is not required for successful completion of the Work or compliance with requirements of the Contract Documents.

1.04 REQUIREMENTS OF REGULATORY AGENCIES
   A. Provide and maintain all temporary facilities in compliance with governing rules, regulations, codes, ordinances and laws of agencies and utility companies having jurisdiction over Work involved in the project.
   B. Be responsible for all temporary Work provided, and obtain any necessary permits and inspections for such Work.
   C. Do not interfere with normal use of streets in vicinity of project site except as indicated on drawings and/or as necessary to execute required Work, and then only after proper arrangement has been made with applicable authorities, including traffic control.
1.05 FIELD OFFICES AND STORAGE SHEDS
   A. Owner will provide the use of an on-site Field Office that will include a Restroom and Electricity/Water.
   B. The Contractor shall provide per the Contract. Storage of construction materials in the building shall be permitted, depending on the type of materials and the duration of expected storage, as determined by the Architect and Owner. All temporary structures shall be removed at Substantial Completion.

1.06 TEMPORARY SERVICES
   A. Temporary Electricity and Lighting:
      1. The Contractor shall provide temporary wiring of a special nature, and power required to complete the Work in accordance with requirements of the Contract Documents.
   B. Temporary Heat and Ventilation:
      1. The Contractor shall provide adequate ventilation of enclosed areas as required to disperse humidity and to prevent hazardous accumulation of dust, fumes, vapors or gasses.
   C. Removal:
      1. Completely remove temporary materials and equipment when their use is no longer required.
      2. Clean and repair damage caused by temporary installations or used for temporary facilities.
      3. Restore permanent facilities used for temporary services to specified condition.
         a. 14 days prior to Substantial Completion, remove temporary lamps and install new lamps in all permanent light fixtures.

1.07 WEATHER PROTECTION
   A. The General Contractor shall provide temporary enclosures and heat to permit Work to be carried on during the months of November through March in compliance with M.G.L. c 149 sec. 44G9(d). These specifications are not to be construed as requiring enclosures or heat for operations that are not economically feasible in the opinion of the Owner.
   B. "Weather Protection" shall mean the temporary protection of the Work adversely affected by moisture, wind, and cold by covering, enclosing, and/or heating. This protection shall provide adequate Work areas during the months of November through March as determined by the Owner and consistent with the construction schedule to permit the continuous progress of all Work necessary to maintain an orderly and efficient sequence of construction operations. The General Contractor shall furnish and install "Weather Protection" material and be responsible for all costs, including heating required to maintain a minimum of 40 degrees Fahrenheit at the Work surface and include temporary enclosures and heat for exterior masonry wall back-up and masonry veneer construction of the building envelope. This provision does not supersede any specified requirements for methods of construction, curing of materials, or the applicable conditions set forth in the Contract Articles with added regard to performance obligations of the General Contractor.
   C. Installation of weather protection and heating devices shall comply with all safety regulations including provisions for adequate ventilation and fire protection devices.
   D. Unit heaters, if used, shall be of the smokeless type and be installed and operated in such a way that they shall not damage finished Work or endanger the health and welfare of the occupants. Salamanders shall not be used.
   E. The General Contractor shall be responsible for weather protection during construction, until Substantial Completion, and shall be liable for any damage to any Work caused by failure to supply weather protection and proper ventilation.
   F. The General Contractor shall remove and replace all Work damaged by frost, directed by the Architect, at no additional cost to the Owner.
   G. It is to be specifically understood that the General Contractor shall do no Work under any conditions deemed unsuitable by the General Contractor to the perfect execution of the Work. This provision shall not constitute any waiver, release, or lessening of the General Contractor’s obligation to bring the Work to Substantial Completion within the period of time set forth in the Contract Documents.
1.08 VEHICLE AND CONTRACTOR ACCESS AND TRAFFIC CONTROL
A. The Contractor shall be responsible for all traffic control, including municipal police services, at streets adjacent to the Project site, as may be required to provide safe access and egress for Owner and construction related vehicles. Provide and maintain a suitable means of access to the Contract Work areas as necessary for vehicles and equipment of all trades requiring such access. Contractor and Subcontractor deliveries.

B. The Contractor shall be responsible for all measures necessary to maintain public access at all times.

1.09 TEMPORARY PARKING
A. Parking for vehicles belonging to the Contractor, Subcontractors, or other personnel providing services included under the Work of this Contract shall be the responsibility of the GC and Sub-contractor. Vehicle parking for all personnel providing services included under the Work of this Contract.

1.10 SCAFFOLDING, LADDERS, AND HOISTING FACILITIES
A. The General Contractor shall provide and maintain all temporary stairs, ramps, runways, chutes, ladders, staging, and hoists as required for proper execution of the Work in accordance with applicable requirements of Federal, State and Local Codes, except as otherwise indicated below. The construction, installation, and maintenance of such equipment shall be in accordance with applicable requirements of Federal, State and Local Codes.

B. The General Contractor shall provide means to safely enable access to all parts of Work by Architect, Owner, or other such person authorized to inspect Work.

1.11 TEMPORARY BARRICADES AND ENCLOSURES
A. Provide temporary enclosure where indicated and where reasonably required to ensure adequate Workmanship and protection from weather, personnel, visitors, and unsatisfactory ambient conditions for the Work.
   1. Provide barricades as required for traffic control at streets adjacent to the Project site, as required to provide safe access and egress for Owner and construction related vehicles.

1.12 SECURITY AND PROTECTION PROVISIONS
A. Provide temporary security and protection provisions including, but not be limited to, guard rails, fire protection, barricades, warning signs/signs, and similar provisions intended to minimize property loses, personal injuries and claims for damages at project site.
   1. Provide types, sizes, numbers and locations of fire extinguishers, as would be reasonably effective in extinguishing fires during early stages, by personnel at project site (minimum 2 per floor of each building).
      Provide type A extinguishers at locations of low-potential for either electrical or grease-oil-flammable liquids fires; provide Type ABC dry chemical extinguishers at other locations; comply with recommendations of NFPA No. 10 “Standard for Portable Fire Extinguishers” and NFPA 241 “Standard for Safeguarding Construction, Alterations and Demolition Operations. Post warning and quick-instructions at each extinguisher location, and instruct all personnel at project site, at time of their first arrival, on proper use of extinguishers and other available facilities at project site. Post local fire department call number at project site.
      a. Perform torch cutting and welding operations only when approved by the Contractor. Provide chemical extinguishers at all locations where such Work is in progress.
      b. Maintain a fire watch of the interior and exterior of the facility for at least one hour after the Project’s daily quitting time when the following activities have been done: torching, welding or other activities capable of starting combustion.

1.13 HAZARDOUS MATERIALS
A. The Contractor is solely responsible for all matters relating to hazardous or toxic materials and lawful removal of same from the site. If hazardous or toxic materials are indicated or discovered, properly inform governing authorities and abide by their requirements.
1.14 DUST AND NOISE CONTROL

A. The Contractor shall use every effort and every means possible to minimize noise caused by his operations, which the Architect, the Owner’s Representative, Owner, or governing authorities may consider objectionable. The noise levels on the construction site will be controlled so that at no time will the noise level measured at the Limit of Work line shall exceed 70dB. The Contractor shall provide Working machinery and equipment equipped with suitable mufflers and sound-deadening panels in accordance with the latest edition of the OSHA regulations. Compressors shall be equipped with silencers or mufflers on intake and exhaust lines. Wherever practical electricity shall be used for power to reduce noise. Dumping bins, hoppers and trucks used for disposal shall be lined with wood or other sound deadening material if required. Where required agencies have jurisdiction, certain noise-producing Work may have to be performed during specified periods only, further; the Contractor and Subcontractors are required to comply with all applicable regulations.

1. Prior to the start of construction, the Contractor shall submit to the Architect, a Noise Control Program for review where Work with high level of noise is anticipated to Work out plans to mitigate the noise impact, especially for Work anticipated to be done during normal work hours.

1.15 SAFETY AND COOPERATION

A. This project is subject to compliance with Public Law 91-596, “Occupied Safety and Health Act of 1970” (OSHA) and all amendments thereto, with respect to all rules and regulations pertinent to construction.

1. The Work of this Contract shall be performed between the hours of 7:00 AM and 5:00 PM, Monday through Friday, and 9:00 AM and 4:00 PM on Saturday. Performance of the Work of this Contract shall not be allowed on Sunday or Holidays. Exceptions to the specified hours of Work shall be allowed in the event of an emergency, in coordination with the Owner.

B. The Contractor shall coordinate all Work and extend full cooperation to Owner’s personnel and the Work of other trades.

C. The following rules and regulations will be required of all personnel providing services included under the Work of this Contract. No deviation or exception will be permitted without the express written approval of the Owner. The Contractor shall take responsibility for ensuring all construction personnel adhere to and cooperate with the Owner in enforcing these responsibilities.

1. All Workers must be properly, permanently and visually identified.

2. All Workers shall maintain their actions in a professional and workmanlike manner while at the Project site. Failure to comply with the following restrictions shall be grounds for permanent removal from the list of authorized workers, as described above. Worker restrictions include, but are not limited to, the following:

   a. No abusive language
   b. No littering
   c. No lewd behavior
   d. No conduct otherwise deemed unacceptable by the Owner or Architect
   e. No smoking on Owner’s property, in accordance with State of Massachusetts law
   f. Consumption of alcoholic beverages on the job, or coming to Work in an intoxicated condition
   g. Possessing or consuming illegal drugs or any other illegal substance while working on the Project
   h. Using or removing Owner's or Subcontractors' possessions from the property without prior written authorization
   i. Violating any state, federal or city statues, rules, regulations, and the like while working on the Project
   j. Possessing firearms or explosives while Working on the Project
   k. Using Project facilities for jobs other than specific assignments directly related to the Work of this Project
   l. Physically abusing or harming an individual who Works at or visits the Project
   m. Duplication of any keys used in the existing or new building without prior written authorization by the Owner
   n. Providing building access at any time to anyone not directly working for the Contractor
   o. Abusing, defacing, or destroying existing or new property of the Owner
   p. Preventing access to all areas of the Project by the Owner, Architect and the Owner's Consultants.
1.16 PRE-INSTALLATION MEETING
   A. The Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the Contractor, Architect, and related Subcontractors.

1.17 RUBBISH REMOVAL
   A. All waste and debris caused by the Work of this Contract shall be removed and legally disposed of off-site, daily, or as otherwise required to avoid large accumulations. The Contractor shall be responsible for providing all labor, materials, and equipment, including dumpsters, required for removal from all parts of the building, site, and other Contract areas, all waste and debris caused by the Work of this Contract.
   B. Burning or on-site disposal of waste and debris caused by the Work of this Contract shall not be allowed.

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION NOT USED

END OF SECTION
PART 1 - GENERAL

1.01 RELATED DOCUMENTS
   A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 1 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK
   A. The Work of this Section includes, but is not limited to, the following:
      1. All cutting and coring
      2. All patching and parging, including attendant excavation and backfill, as required to complete the Work of this Contract.
      3. Making all parts of the Work fit together properly
      4. Uncovering portions of the Work to provide for installation of ill-timed Work
      5. Removal and replacement of defective Work
      6. Removal and replacement of Work not conforming to requirements of Contract Documents
      7. Removal of samples of installed Work as specified for testing
      8. Providing routine penetrations of non-structural surfaces for installation of ductwork, piping and electrical conduit

1.03 RELATED WORK SPECIFIED ELSEWHERE
   A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.
   B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
      1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
      2. Section 02 41 13 – Selective Demolition
      3. DIVISION 03 – CONCRETE; including all Sections contained therein
      4. DIVISION 04 – MASONRY; including all Sections contained therein
      5. DIVISION 05 – METALS; including all Sections contained therein.
      6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
      7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
      8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
      9. DIVISION 09 – FINISHES; including all Sections contained therein.
      10. Section 21 00 00 – Fire Suppression
      11. Section 22 00 00 – Plumbing
      12. Section 23 00 00 - HVAC
      13. Section 26 00 00 – Electrical
      14. DIVISION 31 – EARTHWORK; including all Sections contained therein
      15. Section 32 12 00 – Site Improvements

1.04 SUBMITTALS
   A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures, or as otherwise required for completion and transmittal of all documents required in accordance with requirements of the Contract Documents.
   B. Submit a written request for approval to Architect well in advance of executing any cutting or alteration which affects:
1. The structural value or integrity of any element of the Project;
2. The integrity or effectiveness of weather-exposed or moisture resistant elements or systems.
3. The efficiency, operational life, maintenance or safety of operational elements;
4. The visual qualities of sight-exposed elements.

C. The request shall include the following:
   1. Description of the effected Work, its’ proposed extent, and the reason it cannot be avoided.
   2. The necessity for cutting, alteration or excavation.
   3. The effect on the structural or weatherproof integrity of the Project.
   4. Description of the proposed Work:
      a. The scope of cutting, patching, alteration, or excavation.
      b. The trades who will execute the Work.
      c. Products proposed to be used.
      d. The extent of refinishing to be done.
   5. Alternates to cutting and patching
   6. Cost proposal, when applicable
   7. List utilities that will be disturbed or affected, including those that will be relocated and this that will be temporarily out of service. Indicate how long service will be disrupted.
   8. Indicate dates when cutting and patching are to be performed.

D. Should conditions of the Work or the schedule indicate a change of products from the original installation, Contractor shall submit a request substitution as specified in Supplementary Conditions.

E. Submit a written notice to Architect designating the date and time the Work will be uncovered.

1.05 QUALITY ASSURANCE

A. Requirements for Structural Work:
   1. Do not cut and patch structural elements in a manner that would reduce their load carrying capacity or load deflecting ratio.
   2. Obtain Architect and Engineer approval prior to cutting and patching of the following:
      a. Foundation construction
      b. Bearing and retaining walls
      c. Structural concrete
      d. Structural steel
      e. Lintels
      f. Structural deck
      g. Stair systems
      h. Miscellaneous structural metals
      i. Equipment supports
      j. Piping, ductwork, vessels and equipment.

1.06 CUTTING AND CORING

A. All new Work that requires cutting and coring of existing floors, walls, and/or roof penetrations measuring 4-1/2 in. or less, shall be performed by the Subcontractor of a Filed Sub-Bid Section. The General Contractor shall cut and core existing floors, walls, and/or roof penetrations for sizes not indicated by the Filed Sub-Bid sections.

1.07 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.
PART 2 - PRODUCTS

2.01 MATERIALS

A. Use materials which are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of the existing materials. Comply with specifications and standards for each specific product involved.

2.02 WALL PATCHING AND PARGING

A. Patch and parge damage wall with quick setting, polymer modified, fiber reinforced, cementitious mortar, Planitop 330 Fast, as manufactured by MAPEI, Quikrete, Euclid Chemical, or Architect approved equal. The cementitious mortar shall have the following characteristics:
   1. Can be applied at 1/8 in. to 1-1/4 in. thickness in a single coat.
   2. Mix with water only
   3. Smooth, creamy consistency with easy troweling application.
   4. Fast drying allows tile installation in 90 minutes.
   5. Pot life of 20 to 30 minutes
   6. Non-sagging/non-slumping properties
   7. Non-shrinking formulation
   8. Approved for freeze/thaw environments

2.03 CEILING PATCHING

A. Patch ceiling with gypsum wallboard, Sheetrock Mold Tough Firecode X, as manufactured by United States Gypsum Company, or Architect approved equal. Panels feature a non-combustible, moisture resistant gypsum core, complying with requirements of ASTM C1396, and the following material and performance characteristics:
   1. Thickness: 5/8 in.
   2. Weight: 2.2 lbs./SF
   3. Flame Spread: 15, in accordance with ASTM E 84
   4. Smoke Developed: 0, in accordance with ASTM E 84
   5. Recycled Content: 100%
   6. Edges: Tapered
   7. Ends: Tapered

B. Joint Materials:
   1. Joint Compound shall be Durabond, as manufactured by USG, or Architect approved equal, at areas to receive abuse resistant gypsum wall panels. Provide water resistant compound, USG Sheetrock Brand W/R, or Architect approved equal, at locations of water, mold, and moisture resistant gypsum wall panels.
   2. Joint tape shall be non-perforated paper tape, complying with requirements of ASTM C 475.
   3. Provide Sheetrock Brand, Tuff-Hide Primer-Surfacer, as manufactured by United States Gypsum, or Architect approved equal, at locations of abuse resistant gypsum wall panels, to provide a Level 4 finish.

C. Miscellaneous Materials:
   1. Acoustical sealant shall be non-drying, non-hardening, non-bleeding, non-staining sealant complying with ASTM C 834 and C 919, USG Acoustical Sealant, or Architect approved equal by Pecora or Tremco.
   2. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035 or ASTM A 780.
   3. Provide interior, field-applied paint with a VOC content of 250 g/L or less, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   4. Nonmetallic, Non-shrink Grout: Premixed, nonmetallic, noncorrosive, non-staining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.
   5. Shims: Load bearing, high-density multi-monomer plastic, non-leaching.
6. Laminating adhesive shall be as recommended by the approved gypsum board manufacturer.

7. Fasteners shall be Type S, bugle head, for attaching gypsum panels to steel framing. Fasteners for fiber cement panels attached to steel framing shall be corrosion resistant, Hi-Lo, S-12, bugle head screws. Provide wafer head, Climaseal coated, Type S-12 self-drilling screws for attaching silicone treated sheathing to steel framing. Provide stainless steel fasteners for all fasteners in wet or humid areas, including but not limited to, exterior assemblies, toilet rooms, shower rooms, locker rooms, and kitchen. Provide other types in accordance with requirements of the approved gypsum board or fiber cement board manufacturer. All fasteners shall provide a minimum of 3/4 in. penetration through steel framing.

8. Provide screws, bolts, powder actuated fasteners, inserts and other fasteners that are customarily used in standard construction practices and which are proven capable of supporting at least 3 times design load.

9. Grout for metal door frames shall be Structo-Base Gypsum plaster, as manufactured by U. S. Gypsum or Architect approved equal, complying with ASTM C 28 and C 472.

10. Provide rigid vinyl trim at locations where gypsum board edge is exposed or abutting dissimilar materials, except at all areas of interior Work subject to high humidity, including locker rooms, shower rooms, and kitchen. Trim shapes shall be RP-2, RP-4, and RP-46, as manufactured by USG, or Architect approved equal.

PART 3 - EXECUTION

3.01 INSPECTION

A. Inspect existing conditions of the Project, including elements subject to damage or to movement during cutting and patching.

B. After uncovering Work, inspect the conditions effecting the installation of Products, or performance of the Work.

C. Report unsatisfactory or questionable conditions to the Architect in writing; do not proceed with the Work until the Architect has provided further instructions.

3.02 PREPARATION

A. Provide adequate temporary support as necessary to assure the structural value or integrity of the effected portion of the Work.

B. Provide devices and methods to protect other portions of the Project from damage.

C. Provide protection from the elements for that portion of the Project which may be exposed by cutting and patching Work and maintain excavations free from water.

3.03 PATCHING AND PARGING APPLICATION

A. Preparation: All substrates shall be structurally sound, stable, dry, clean, and free of any substance or condition that may reduce or prevent proper adhesion.

1. For direct-bond applications, the concrete surfaces must be clean and porous with a minimum concrete surface profile (CSP) of #2.

2. Surface exposed to direct sunlight or wind must be dampened with a wet sponge before applying the cementitious mortar.

3. Concrete substrates shall be saturated surface dry.

B. Mixing: Mix thoroughly until the mixture becomes a smooth, homogenous, lump free paste. The paste remains workable for approximately 20 to 30 minutes at 70 deg. F.

C. Application: The polymer modified cementitious mortar shall be applied at 1/8 in. to 1-1/4 in. in thickness in a single coat.

1. Apply a thin skimcoat / bonding layer of polymer modified cementitious mortar into the substrate using a flat trowel.
2. Immediately apply a build layer of polymer modified cementitious mortar into the fresh skimcoat at the thickness required to level and even the substrate in a single layer, up to maximum of 1-1/4 in.

3.04 GYPSUM WALLBOARD INSTALLATION

A. Strictly comply with the approved manufacturers written instructions and recommendations, except where more restrictive requirements are specified in this Section.

B. Installation of gypsum board and all related materials shall be in strict compliance with requirements of ASTM C 840 and Gypsum Association publication No. 216, *Recommended Specifications for the Application and Finishing of Gypsum Board*, and the following:

1. Locate joints between boards as far from center of walls and ceilings as possible
2. Stagger vertical joints on opposite sides of walls and in multiple layer Work
3. Install gypsum and related board materials with face side out and with joints over framing members
4. Do not butt dissimilar board edges
5. Cover both faces of stud partitions, except at chase walls
6. Attach boards to framing with self-tapping, bugle head screws or fasteners recommended by manufacturer
7. Space fasteners as recommended by manufacturer
8. Install drywall ceilings prior to gypsum board walls
   a. Provide one layer of gypsum board at ceilings as indicated on the Drawings.
9. Form control joints by preparing space between edges to receive metal control joint trim
C. Provide all additional supplemental framing at ceilings as may be required to comply with written requirements of the approved manufacturer, and the *Gypsum Construction Handbook*, as published by USG.

D. Provide continuous bead of acoustical sealant at both faces of bottom runners, perimeters, openings, expansion and control joints. Close off all sound flanking paths and openings, including those above ceilings.

1. Installation of acoustical insulation and sealant to seal tightly and completely around penetrating objects through non-fire rated gypsum drywall, including but not limited to, HVAC duct, fire protection piping, and electrical conduit, shall be provided under the Work of Section 07 92 00 – Joint Sealants.

E. Strictly comply with manufacturer’s instructions and recommendations for installation of metal trims and accessories. Meet installation tolerance requirements.

1. Provide corner bead trim at all external corners. Provide joint reinforcing tape at all internal corners.
2. Provide control joints where shown, or not less than 30 ft. O.C., at locations approved by the Architect.
3. Provide edge trim wherever edge of gypsum board is exposed, revealed, sealant filled, abutting dissimilar materials.
4. Provide galvanized trim accessories at all Toilets.

F. Provide 3 coats joint compound treatment at all joints, flanges of trim accessories, penetrations, fastener heads and surface defects. Provide Level 4 finish at all interior areas to receive gypsum wall panels, and prior to application of primer/surfacer at locations of abuse resistant gypsum wall panels.

1. Extend joint finishing to floor behind wall base to provide a smooth flat surface for installation of wall base.
2. For water-resistant board applications, use special water-resistant joint compound to seal joints, cover fastener heads, fill surface defects and seal cut edges.

3.05 PERFORMANCE

A. Wall and floor openings required for installation of new fire protection, plumbing, mechanical, and electrical Work, shall be saw cut by the respective Subcontractor. Determination of locations of wall and floor openings required for installation of new mechanical, plumbing, and electrical Work shall be completed prior to submittal of Coordination Drawings, in accordance with requirements of the Contract Documents.

B. Execute cutting and demolition by methods which will prevent damage to other Work, and will provide proper surfaces to receive installation of repairs and new finishes.

C. Employ the Original Installer or Fabricator to perform cutting and patching for:

Cutting and Patching

01 51 00 - 5
1. Weather-exposed or moisture-resistant elements.
2. Sight-exposed finished surfaces.

D. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances and finishes.

E. Restore Work which has been cut or removed; install new products to provide completed Work in accord with requirements of Contract Documents.

F. Fit Work airtight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.

G. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes:
   1. For continuous surfaces, refinish to nearest intersection.
   2. For an assembly, refinish the entire unit.

H. Thoroughly clean areas and spaces where cutting and patching Work has been performed. Leave areas free of debris and in condition to accept final finishes.

3.06 RUBBISH REMOVAL

A. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION
SECTION 01 51 11

PROGRESS SCHEDULE

PART I - GENERAL

1.01 RELATED DOCUMENTS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 1 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK

A. The Work of this Section shall include, but not be limited to, the following:
   1. Administrative and procedural requirements for the Contractor's Progress Schedule, which is required to be in a Critical Path Method (CPM) format.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.
B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
   2. Section 02 41 13 – Selective Demolition
   3. DIVISION 03 – CONCRETE; including all Sections contained therein
   4. DIVISION 04 – MASONRY; including all Sections contained therein
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
   7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
   8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
   9. DIVISION 09 – FINISHES; including all Sections contained therein.
   10. Section 21 00 00 – Fire Suppression
   11. Section 22 00 00 – Plumbing
   12. Section 23 00 00 - HVAC
   13. Section 26 00 00 – Electrical
   14. DIVISION 31 – EARTHWORK; including all Sections contained therein
   15. Section 32 12 00 – Site Improvements

1.04 PRELIMINARY SCHEDULE

A. Preliminary Submittal: Submit, within 10 calendar days following receipt of the Notice to Proceed, a detailed Project Schedule, in bar chart format.

1.05 PROGRESS SCHEDULE (CPM), SUBMITTALS

A. Prepare the Progress Schedule required by the General Conditions in the form of a Critical Path Method network, to control work of this Contract and to provide a definitive basis for determining job progress. Require each principal subcontractor to provide detailed information about their own portion of the Work; include this information in the CPM Progress Schedule.
B. Use commercially available CPM scheduling software to develop and maintain the schedule and to prepare and print spreadsheets, schedules, Gantt charts, and reports for the Project. The Contractor shall coordinate the required scheduling software with the Owner's designated representative. Prepare a spreadsheet listing activities, a network schedule showing the connections between activities, and Gantt Charts (bar charts) as required by this Section.
C. Within 10 business days following receipt of the Notice to Proceed, submit the following to the Architect and Construction Manager for review:
   1. An illustration of a feasible CPM schedule for completion of the Work of the Contract within the time limits specified
   2. Sample format to be utilized for the detailed CPM in accordance with requirements of the Contract Documents
   3. Milestone dates

D. Upon approval of the draft submittal, prepare and submit the CPM network; prepare the schedule with spreadsheet information.
   1. Correlate the Progress Schedule with the Schedule of Values required under Section 01 00 00 – General Requirements, so that the value of the Work in place at any time can be definitively determined. Each activity on the CPM schedule shall appear on the Schedule of Values.
   2. Submit the full detailed schedule to the Architect and Owner for review and approval within 10 days following receipt of the Notice to Proceed, and at least 25 working days before the first Application for Payment is submitted. The Architect will not review any Application for Payment until the CPM schedule has been submitted and approved.

E. Submit 3 copies, and electronic file in format acceptable to the Architect, of the schedule for review by Architect and Owner. Make changes as directed by the Architect and resubmit within 10 calendar days.
   1. Acceptance and approval of the Construction Schedule by the Owner and Architect is a prerequisite to certification of the first Application for Payment.
   2. The Architect's approval of the Construction Schedule shall not relieve the Contractor of responsibility for timing, planning and scheduling of the Work, nor impose any duty on the Architect or Owner with respect to the timing, planning or scheduling of the Work.

F. After the initial schedule has been approved, print, and distribute colored copies of the approved schedule to the Architect, Owner, subcontractors, and other parties required to comply with scheduled dates. Place one copy in the job site file and post copies in the Project meeting room and temporary field office.
   1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

1.06 PROGRESS SCHEDULE, CONTENT AND FORMAT

A. The Start Date for the CPM Progress Schedule shall be the date of the Notice to Proceed. The date for Final Completion, shall be 10 days after the date scheduled for Substantial Completion.

B. Classes of Work: List as separate classes of work on the spreadsheet and schedules:
   1. Each category of work listed in the Schedule of Values
   2. Activities by others that have to be coordinated with Contractor's work, such as:
      a. Inspections by the Owner's Testing and Inspection Agency
      b. Work by separate contractors
      c. Architect's inspection at the time of Partial Completions and at the time of Substantial Completion
      d. Additional subdivisions of work as the Contractor deems necessary to control the progress of the Work, or as requested by the Owner or Architect.

C. Input from Subcontractors: Require each Principal subcontractor to provide detailed information about their own Portion of the Work; include this information in the Progress Schedule.

D. Spreadsheet: On the spreadsheet for the Project, for each activity included in the spreadsheet, as a minimum the following information:
   1. A code number for the activity.
   2. Description of the activity
   3. Early and late start dates. These dates may not be changed after the activity has commenced and the actual start date has been inserted (see item10).
4. Duration
5. Early and late finish dates. These dates may not be changed after the activity has been completed, and the actual finish date has been inserted (see item 10).
6. Activity float
7. Percentage completion
8. Remaining duration
9. Predecessor activities and successor activities, including start constraints for activities with no predecessor.
10. Blank columns for Actual Start and Actual Finish dates, to be filled in with each monthly submission.
11. Dollar amount for the activity.
12. Number of tradesmen and laborers required for each activity ("manpower loading")
13. Print in red activities on the critical path.

E. CPM Schedule: On the CPM Schedule for the Project, show the order and interdependence of activities and the sequence in which work is to be accomplished, as planned by the Contractor. Show predecessor and successor activities; show the start of a given activity is dependent on completion of preceding activities and how its completion is necessary for the start of following activities.
1. Provide a path for each trade or significant type of work. Use the same breakdown of units of the Work as indicated for the spreadsheet.
2. Arrange schedule to show graphically major sequences for Coordinating work; lead times required; float time allowed; all major categories of work and critical minor work units affecting overall work sequences. Show phased completion dates. Show dates when Owner will be moving in equipment, furniture, and fixtures.
3. Break each trade or class of Work into specific activities, each of duration no longer than 20 calendar days, and structured by Work area, i.e., floors, wings, etc. Selection and number of activities shall be subject to Architect's approval. Non-construction activities (such as procurement and delivery) and such other activities which the Architect may approve, may be of longer duration. At a minimum, break out the following as separate activities, where they apply to a type of Work.
   a. Construction activities
   b. Fabrication
   c. Delivery
   d. Installation
   e. Testing
   f. Start-up
   g. Instruction of Owner's Personnel
4. Critical Path: Clearly define the Critical Path beginning with the Notice to Proceed and ending at Substantial Completion. Activities on the Critical Path shall have no (zero) float time indicated. Print in red activities which are on the critical path.

F. Utilization of Float Time: It is intended by the Awarding Authority that the Work should progress as expeditiously as possible. To this end, the Contractor shall proceed with the start of each activity promptly upon the completion of the previous activity or activities on which it depends. If the Contractor completes an activity on the scheduled "early finish date" or sooner, the Contractor shall not expend the "float time" for that activity (if any) but rather reserve it as a safeguard against possible impediments or delays which may occur later in the progress of the Work. Float time is to be expended judiciously, for the benefit of the Project as a whole, and not for the convenience of the Contractor or the Owner. Neither the Contractor nor the Owner "owns" the project float time: the float time belongs to the Project.

1.07 MONTHLY REPORTS
A. Report progress for the Project on a bi-weekly basis. Evaluate the status of the work as of the 25th of each month to show actual progress and identify, problem areas. Include Change Orders and Construction Change Directives within the updated schedule. With each Contractor Application for Payment, submit one (1) electronic copy, and three (3) colored copies of the complete update schedule, accompanied by a written narrative.
1.08 SUBMITTALS
A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures, or as otherwise required for completion and transmittal of all documents required in accordance with requirements of the Contract Documents.

1.09 PRE-INSTALLATION MEETING
A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 – PRODUCTS NOT USED

PART 3 - EXECUTION NOT USED

END OF SECTION
PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION OF WORK

A. Products, which include materials, equipment, and systems of assemblies of materials and equipment, shall conform to the requirements listed in each of Section of the Specifications. Provide connections, fasteners, accessory materials, trim, finish and other accessories needed for proper use, function and appearance.

1. Where available, provide standard products of types which have been produced and used previously and successfully on other projects and in similar applications.

2. Where additional amounts of a product, by nature of its application, are likely to be needed by Owner at a later date for maintenance and repair or replacement Work, provide a standard, domestically produced product which is likely to be available to Owner at such later date.

B. Nameplates: Except as otherwise indicated for required approval labels, and operating data, do not permanently attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products which shall be exposed in occupied spaces or on exterior of the Work.

1. Labels: Locate required labels and stamps on a concealed surface, or where required for observation after installation, on an accessible surface which, in occupied spaces, is not conspicuous.

2. Equipment Nameplates: Provide permanent nameplate on each item of service-connected or power operated equipment. Indicate manufacturer, product name, model number, serial number, capacity, speed, ratings, and similar essential operating data. Locate nameplates on an easily accessed surface which in occupied spaces, is not conspicuous.

C. Products are specified by:

1. The descriptive method: Listing qualities that they must possess
2. The reference standard method: Listing published product standards
3. The proprietary method: Listing one or more source names, which may include such information as name of manufacturer or fabricator, trade name, or catalog number
4. A combination of the above three.

D. Where a reference standard is specified, the edition of the standard in the current governing building code shall be followed. Where the standard is not listed in the building code, follow the edition current with the issue date of these Specifications.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
2. Section 02 41 13 – Selective Demolition
3. DIVISION 03 – CONCRETE; including all Sections contained therein
4. DIVISION 04 – MASONRY; including all Sections contained therein
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
9. DIVISION 09 – FINISHES; including all Sections contained therein.
10. Section 21 00 00 – Fire Suppression
11. Section 22 00 00 – Plumbing
12. Section 23 00 00 - HVAC
13. Section 26 00 00 – Electrical
14. DIVISION 31 – EARTHWORK; including all Sections contained therein
15. Section 32 12 00 – Site Improvements

1.04 PRECEDENCE: QUALITY, REFERENCE STANDARD, AND SOURCE

A. Qualities:
   1. For the products specified by stated qualities or by the description, as well as by the reference standard or by the source, the specified qualities or description shall take precedence.
   2. For a product specified only by stated qualities or by the description, provide materials, equipment or fabrications conforming to those qualities and description, suitable for the uses shown on the Drawings.

B. Reference Standards:
   1. For product specified by reference to a published standard, as well as buy the source, the reference standard shall take precedence over the source.
   2. For a product described only by reference standard, provide material, equipment or fabrications conforming to that reference standard, suitable for the use shown on the Drawings.

C. Procedures for Selecting Products: Contractor's options for selecting products are limited to Contract document requirements and governing regulations and are not controlled by industry traditions or procedures experienced by Contractor on previous construction projects. Required procedures include, but are not limited to, the following for various methods of specifying:
   1. For a product described by manufacturer, manufacturer's brand name, or origin, with or without catalog number or model number, provide a product that conforms to the specified qualities and reference standards.
   2. For a product specified by source and "no substitution", provide only that product specified. No request for substitution shall be considered.
   3. For a product specified by one or more names, provide any one of the products specified. Where two or more sources are named, the choice is the Contractor's. Any other product shall be considered only if requested as substitution.
   4. For a product specified by one or more source names and "or approved substitute", provide one of the specified products, or, submit a request for substitution for a product not named which the Contractor can demonstrate to be of equal or higher quality.
   5. Performance Requirements: Provide products which comply with specific performances indicated, and which are recommended by manufacturer for overall application indicated. Overall performance of a product is implied where product is specified with only certain specific performance requirements.
   6. Prescriptive Requirements: Provide products which have been produced in accordance with prescriptive requirements, using specified ingredients and components, and complying with specified requirements for mixing, fabricating, curing, finishing, testing and similar operations in manufacturing process.
   7. Visual Matching: Where matching with an existing product or established sample is required, final judgement of whether a product proposed by the Contractor matches sample satisfactorily is the Architect's judgement. Where no product within specified cost category is available, which matches sample satisfactorily and complies with requirements, comply with Contract document provisions concerning, "Substitutions" and "Change Orders" for selection of a matching product outside established cost category or a product not complying with requirements.
1.05 CONTRACTOR'S OPTION
A. Where an option (or choice) is specified, provide one or the other of the options. The choice of an option is the Contractor's. Where submittals are required, he shall state which option has been chosen by him.

B. For economy of drawing, only one option is usually shown on the Drawings. If another option is elected by the Contractor, he shall adjust details, dimensions and physical settings to conform. The Contractor shall review adjustments and details with the Architect before implementation.

1.06 SPECIAL WARRANTIES AND SERVICE
A. In addition to the warranty and correction Work provisions of the General Conditions, provide the following as specified:
   1. Special Warranties: A warranty or guarantee provide by the manufacturer, fabricator, supplier or installer and the Contractor providing specific representation of quality and fitness for a specific period. When also specified, a special warranty lists the actions the Contractor, his installer, supplier or manufacturer shall take to correct defective Work.
   2. Service: Specific programs of service that a manufacturer, fabricator, supplier or installer and the Contractor shall provide for a specific period of time. Service programs shall, as specified, provide such Work as inspections, reports, parts, materials, and other products or Work needed to render the services.

B. The Architect and Owner reserve the right to not accept unrequested warranties and guarantees offered by the Contractor, his installers or suppliers.

C. Special warranties shall not be required to cover failure from:
   1. Hurricane, floods or acts of God;
   2. Misuse or improper maintenance by the Owner;
   3. Vandalism or misuse by the public after time of Substantial Completion.

D. When defective Work is corrected under the special warranty provisions, the warranty period shall be extended by the period of time between Substantial Completion and the correction of the Work.

1.07 CERTIFICATION BY MANUFACTURERS OR INSTALLERS
A. Provide where specified, as a submittal, certification by the manufacturer or installer that the product and its method of installation are suitable for:
   1. The type of construction and use of this product
   2. For the New England climate
   3. For the design intent expressed in the Contract Documents

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING
A. Deliver handle and store products in accordance with manufacturer's recommendations and by methods which prevent damage, deterioration and loss, including theft.

B. Control delivery schedule to minimize long term storage of products at site and overcrowding of construction spaces. Provide delivery/installation coordination to ensure minimum holding or storage times for products that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other sources of loss.

1.09 SUBMITTALS
A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures

1.10 SUBSTITUTION REQUEST PROCEDURE
A. For a period of 60 days after the start of Contract Time, the Architect will review written requests from the Contractor for changes in products, materials and methods of construction required by Contract Documents. These changes are considered request for "substitutions", and are subject to requirements hereof. Substitutions received after the 60-day commencement of Work may be considered rejected at the discretion of the Architect.
1. Work not defined as Substitutions: The requirements for substitutions do not apply to the following:
   a. Specified Contractor options on products and construction methods.
   b. Revisions to Contract Documents requested by Owner or Architect are "changes" not "substitutions".
   c. Requested substitutions during bidding period, which have been accepted prior to Contract Date and included in Contract Documents.
   d. Contractor's determination of and compliance with governing regulations and orders issued by governing authorities do not constitute "substitutions" and do not constitute a basis for change orders, except as provided for in Contract Documents.

B. Requests for Substitutions: Submit 3 copies of substitution request form provided herein, fully identified for product or method being replaced by substitution, including related specification Section and drawing number(s), and fully documented to show compliance with requirements for substitutions. Include product data/drawings, description of methods, samples where applicable, Contractor's detailed comparison of significant qualities between specified item and proposed substitution, statement of effect on construction time and coordination with other affected Work, cost information or, proposal, fabrication and installation procedures and Contractor's statement to the overall Work as a substitute to or -better-than Work originally indicated.

C. Conditions: Contractor's request for substitution shall be received and considered when extensive revisions to Contract Documents are not required and changes are in keeping with the general intent of Contract Documents; when timely, fully documented and properly submitted; and when one or more of the following conditions is satisfied, all as judged by the Architect. The review of substitution requests is an extra service of the Architect, limited by the Owner's authorization of the Architect to perform such services. The Owner will charge the Contractor for the Architect's processing of substitution requests, except when the Contractor can demonstrate that one of the following cases applies. Otherwise, requests shall be returned without action except to record non-compliance with these requirements.
   1. When the indicated product or method cannot be provided within the approved progress schedule, but not as the result of the Contractor's failure to Contract, order, purchase, fabricate, prepare other Work, or coordinate the Work well in advance of need.
   2. When the indicated product or method is not compatible with other products or Work, cannot be coordinated or fit into Work, or shall demonstrably have adverse effect on permanence, function or use of the Work.
   3. When the indicated product or method is not approved by public authorities.
   4. When the substitute request is made in response to a source specified as "Architect approved substitute".

1.11 PRE-INSTALLATION MEETING

   A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION NOT USED
SUBSTITUTION REQUEST

Project: New Bedford Police Station Headquarters - Sally Port Addition & Parking Lot Resurface
Project No.: 02014.43

Owner: City of New Bedford

To: Mount Vernon Group Architects, Inc.

From: Architects: 47 N. Second Street
New Bedford, MA 02740
Attn: Mr. Jorge Fiqueiredo

CONTRACTOR’S REQUEST, WITH SUPPORTING DATA

1. Section of Specifications to which this request applies: __________
   6 Digit Section number
   ___ Product data for proposed substitution is attached (description of product, reference standards, performance and test data).
   ___ Sample is attached
   ___ Sample shall be sent if requested by Architect

2. Itemized comparison of proposed substitution with product specified.

   ORIGINAL PRODUCT                     SUBSTITUTION

   Name, brand:

   Catalog No.:

   Manufacturer:

   Significant Variation:

3. Unit cost of original product and proposed substitution. State whether cost is for _____ material only, or _____ material installed.

   Original Product: $_______ per ________ Substitution: $_______ per ________

4. Proposed change in Contract Sum:

   Credit to Owner: ____________________ Additional cost to Owner:

5. Proposed change in Contract Time:

   Reduce/Increase Contract time by: _______________days.

6. Effect of the proposed substitute on other parts of the Work, or on other Contracts:

7. Reason for requesting substitution:
CONTRACTOR’S STATEMENT OF CONFORMANCE OF PROPOSED SUBSTITUTION TO CONTRACT REQUIREMENTS:

I/we have investigated the proposed substitution. I/we:

1. believe that it is equal or superior in all respects to the originally specified product, except as stated in 2. above;
2. shall provide the same warranty in accordance with General Conditions 4.1.5.;
3. shall provide the same special warranty or guaranty as specified;
4. have included all cost data and cost implications of the proposed substitution;
5. shall pay redesign and special inspection costs caused by the use of this product;
6. shall pay additional costs to other Contractors caused by substitution;
7. shall coordinate the incorporation of the proposed substitution in the Work;
8. shall modify other parts of the Work as needed, to make all parts of the Work complete and functioning.
9. waive further claims for added cost to Contractor caused by the proposed substitution.

Contractor: _________________________________ Date: _____________________

ARCHITECT REVIEW AND ACTION

A. Provide more information in the following categories. Resubmit.
B. Sign Contractor’s Statement of Conformance. Resubmit.
C. The proposed substitution is approved, with the following conditions:

D. The following changes shall be made by change order:
   1. Addition/Deduction from the Contract Sum:
   2. Addition/Deduction from Contract Time:

Mount Vernon Group Architects, Inc.: _________________________________
Date: ____________________________________

END OF SECTION
SECTION 01 71 00

CLEANING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS
   A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 1 - General Requirements, apply to the work of this Section.

1.02 DESCRIPTION OF WORK
   A. The Work of this Section shall include, but not be limited to, the following:
      1. Cleaning of the Project site and building interior during progress of the Work, and at completion of the Work, in accordance with requirements of the Contract Documents.
      2. Re-cleaning of areas affected by the new construction following completion of the Work.

1.03 RELATED WORK SPECIFIED ELSEWHERE
   A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.
   B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
      1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
      2. Section 02 41 13 – Selective Demolition
      3. DIVISION 03 – CONCRETE; including all Sections contained therein
      4. DIVISION 04 – MASONRY; including all Sections contained therein
      5. DIVISION 05 – METALS; including all Sections contained therein.
      6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
      7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
      8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
      9. DIVISION 09 – FINISHES; including all Sections contained therein.
     10. Section 21 00 00 – Fire Suppression
     11. Section 22 00 00 – Plumbing
     12. Section 23 00 00 - HVAC
     13. Section 26 00 00 – Electrical
     14. DIVISION 31 – EARTHWORK; including all Sections contained therein
     15. Section 32 12 00 – Site Improvements

1.04 PRE-INSTALLATION MEETING
   A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 - PRODUCTS

2.01 MATERIALS
   A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.
   B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.
C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.01 DURING CONSTRUCTION
A. Execute periodic cleaning to keep the Work, the site and adjacent properties free from accumulations of waste materials, rubbish and windblown debris, resulting from construction operations.
B. Provide on-site containers for the collection of waste materials, debris and rubbish.
C. Remove waste materials, debris and rubbish from the site periodically and dispose of at a legal disposal areas away from the site.

3.02 DUST CONTROL
A. Clean interior and exterior spaces and surfaces upon completion of work.

3.03 FINAL CLEANING
A. Employ skilled Workmen for final cleaning.
B. Just prior to inspection for Final Completion, perform a complete cleaning of the project area including, without limitation the following:
   1. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials form sight-exposed interior and exterior surfaces.
   2. Sweep resilient flooring
   3. Vacuum carpet.
   4. Remove protective covers from, clean and polish exposed to view equipment, Mechanical and electrical fixtures, windows, hardware etc.
   5. Remove debris and dirt from concealed spaces such as ceiling plenums, chases, pipe and duct spaces.
   6. Clean electric light fixtures to allow for full efficiency.
C. Owner will assume responsibility for cleaning as of the date designated on Certificate of Substantial Completion for the Owner's acceptance of project, or portion thereof.

3.04 RUBBISH REMOVAL
A. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.
SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS
   A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 1 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK
   A. The Work of this Section shall include, but not be limited to, maintaining at the site for the Building Superintendent one record copy of the following:
      1. Drawings
      2. Specifications
      3. Addenda
      4. Change Orders and other Modifications to the Contract
      5. Architect's Field Orders or written instructions
      6. Approved Shop Drawings, Product Data and Samples
      7. Field Test Records

1.03 RELATED WORK SPECIFIED ELSEWHERE
   A. Carefully examine all the Contract Documents for requirements which effect the Work of this Section.
   B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
      1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
      2. Section 02 41 13 – Selective Demolition
      3. DIVISION 03 – CONCRETE; including all Sections contained therein
      4. DIVISION 04 – MASONRY; including all Sections contained therein
      5. DIVISION 05 – METALS; including all Sections contained therein.
      6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
      7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
      8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
      9. DIVISION 09 – FINISHES; including all Sections contained therein.
      10. Section 21 00 00 – Fire Suppression
      11. Section 22 00 00 – Plumbing
      12. Section 23 00 00 - HVAC
      13. Section 26 00 00 – Electrical
      14. DIVISION 31 – EARTHWORK; including all Sections contained therein
      15. Section 32 12 00 – Site Improvements

1.04 GENERAL REQUIREMENTS
   A. Provide all necessary equipment, including but not limited to, lockable files, racks, and secure storage as required to maintain storage of documents and samples in a clean, dry, legible condition and in good order.
   B. Documents and samples shall be filed in accordance with data Filing Format of the Uniform Construction Index.
   C. Record Documents shall not be used for construction purposes.
   D. Make Documents and samples available at all times for inspection by Architect/Engineer.
E. Provide felt tip marking pens for recording information in the color code designated by the Architect.

1.05 RECORDING
A. Label each document "PROJECT RECORD" in neat large printed letters located in the bottom right hand corner.
B. Record information concurrently with construction progress.
   1. Do not conceal any Work until required information is recorded.
C. Drawings shall be legibly mark daily to record actual construction, as follows:
   1. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   2. Location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the structure.
   3. Field changes of dimensions and detail.
   4. Changes made by Field Order or by Change Order.
   5. Details not on original Contract drawings.
   6. Record Drawings shall be updated each Working day. Monthly pay requisitions shall not be processed if record drawings are not up to date.
D. Individual Specification Sections and Contract Document Addenda shall be legibly marked to record the following.
   1. Manufacturer, trade name, catalogue number, and supplier of each product and item of installed equipment.
   2. Changes made by Field Order or by Change Order.

1.06 SUBMITTALS
A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures in accordance with requirements of the Contract Documents.
B. Prior to Contractor claim of Substantial Completion for specified phases of the Work and the entire Work, the Contractor shall deliver Record Documents to the Architect for review and approval.
C. Upon receipt of approval of Record Documents from the Architect, the Contractor and Subcontractors shall transfer the as-built information shown on the Record Drawings onto compact disc, in a format compatible with equipment and programs provided under the Work of Section 01 50 00 – Temporary Facilities and Controls, or as otherwise required by the Owner.
D. Submission of accurate record drawings and their approval shall be a condition precedent to final payment.
E. Submittals of Record Documents shall be accompanied with transmittal letter in duplicate, containing the following information:
   1. Date
   2. Title and number of each Record Document
   3. Signature of the Contractor or his authorized representative

1.07 OPERATIONS AND MAINTENANCE MANUALS
A. Prior to Contractor claim of Substantial Completion for specified phases of the Work and the entire Work, submit Operation and Maintenance (O&M) manuals to the Architect for review. Generally, include operation and maintenance information for all items of equipment, and maintenance information for all products which may require special care, such as carpet and special finishes, whether or not a submittal is specifically required by the technical Sections of these specifications.
   1. Include complete schematic, electrical and connection diagrams for each item of equipment.
   2. Include instructions for installation, start-up. Operation, inspections, maintenance, parts lists and data sheets.
   3. On manufacturer's printed literature, where the literature covers more than one model, indicate by check mark or circle in ink the correct model number and data for the model number.
B. Arrange manuals, instruction books, diagrams, etc. in the order and manner prescribed by the Owner. In the absence of other instructions from the Owner, organize the operation and maintenance manuals as described in this Article.

C. Bind instruction books in hard durable covers supplied by the manufacturer, or in 3-ring binders with vinyl covers.
   1. Identify each volume on front and spine with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS," title of Projects, identity of subject matter covered in each volume.
   2. Inside cover and Title Page shall repeat information on the cover and identify the General Contractor, name of responsible principal, address and telephone number.
   3. Provide Table of Contents for each volume, arranged in systematic order, neatly type written. Organize information by systems, following the sequence of the table of contents of the Project Manual.
   4. Separate products and systems within the binder by tabbed and labeled dividers.
   5. For each item or system, Include the name, address and phone number of the Subcontractor who furnished and/or installed the equipment, the name(s) and telephone numbers of the Subcontractor's representative to be contacted in the event of an emergency, and the name, address and phone number of the nearest service facility authorized by the manufacturer.

D. Require each manufacturer to prepare/provide information on its own products. In those instances where equipment or controls are job-assembled by a Subcontractor, then require that the Subcontractor prepare maintenance instructions.

E. Information for complex systems, such as elevators and handicap lifts, may be separately bound. Include a tabbed divider for the system and insert a page directing the reader to the separate volume, or include a clear cross reference in the table of contents.

F. Submit one review copy of the fully compiled data in final form. The Architect will review the copy and return it with comments. Upon receipt of approval of O&M Manuals from the Architect and OPM, the Contractor and Subcontractors shall resubmit one (1) corrected and bound hard copies, and three (3) electronic disk copies in a format compatible with equipment and programs provided under the Work of Section 01 50 00 – Temporary Facilities and Controls.

1.08 WARRANTIES AND GUARANTEES

A. Prior to Contractor claim of Substantial Completion for specified phases of the Work and the entire Work, assemble two (2) executed copies of each warranty, bond, and service and maintenance Contract required for the project. Warranties are specified in the respective trade Sections of the specifications.

B. Bind these in 3-ring loose leaf binders with vinyl covers
   1. Identify each volume on front and spine with typed or printed title "WARRANTIES," title of Projects, identity of subject matter covered in each particular volume.
   2. Inside cover and Title Page shall repeat information on the cover and identify the General Contractor, name of responsible principal, address and telephone number.
   3. Table of contents: For each volume, arrange in systematic order, neatly type written.

C. For items of Work delayed beyond Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.

1.09 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification Sections.

B. Deliver to Project site and place in location directed. Obtain receipt prior to final payment.

1.10 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.
PART 2 – PRODUCTS NOT USED

PART 3 – EXECUTION NOT USED

END OF SECTION
PART 1 - GENERAL

1.01 RELATED DOCUMENTS
   A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 1 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK
   A. The Work of this Section includes, but is not limited to, the following:
      1. General testing requirements and procedures
      2. Acceptance testing in accordance with provisions of 780 CMR 120 of all HVAC, and electric power distribution systems, including operational features and controls
      3. Responsibilities of the Contractor
      4. Responsibilities of the Owner

1.03 RELATED WORK SPECIFIED ELSEWHERE
   A. Carefully examine all the Contract Documents for requirements which effect the Work of this Section.
   B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
      1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
      2. Section 02 41 13 – Selective Demolition
      3. DIVISION 03 – CONCRETE; including all Sections contained therein
      4. Section 04 21 11 – Reinforced Unit Masonry
      5. DIVISION 05 – METALS; including all Sections contained therein.
      6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
      7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
      8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
      9. DIVISION 09 – FINISHES; including all Sections contained therein.
      10. Section 21 00 00 – Fire Suppression
      11. Section 22 00 00 – Plumbing
      12. Section 23 00 00 - HVAC
      13. Section 26 00 00 – Electrical
      14. DIVISION 31 – EARTHWORK; including all Sections contained therein
      15. Section 32 12 00 – Site Improvements

1.04 SUBMITTALS
   A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures, or as otherwise required for completion and transmittal of all documents required in accordance with requirements of the Contract Documents.
1.05 REQUIRED TESTING

A. The Owner will employ independent testing agencies to perform field and lab tests unless otherwise specified or indicated in other Sections of these Specifications. This testing will be paid for by the Contractor, unless otherwise specified or indicated. Employment of Testing Laboratory shall in no way relieve Contractor of his obligation to perform Work in accordance with the Contract. The Contractor shall provide standard factory testing, certification of compliance with specified requirements, testing for fire performance, and other tests as specified or indicated. Contractor employed testing agencies must be approved by the Architect.

B. Electrical Power System Testing: At least the following tests will be performed. Where noted with an asterisk*, the test shall be performed and paid for by the installing Contractor and witnessed by the Owner's Representative.
   1. Polarity tests*
   2. Operation of all circuits*
   3. Ground megger tests*
   4. Megger tests of all circuits*
   5. Hi Pot and Dielectric tests of all high voltage cables, connections, oil-filled equipment, and the like*
   6. Lab tests to verify quality of all materials and components

C. Electrical Lighting System Testing: At least the following tests shall be performed, paid for by the installing Contractor and witnessed by the Owner's Representative.
   1. Operation of every component of entire system

D. Fire Alarm System Testing: At least the following tests will be performed. The tests shall be performed and paid for by the installing Contractor and witnessed by the Owner's on-site representative.
   1. All smoke and heat detectors.
   2. Proper operation as required by authorities having jurisdiction*

1.06 TESTING REQUIREMENTS AND PROCEDURES

A. The Contractor shall fully cooperate with testing agencies and permit free access to all areas at all times. The Contractor shall permit taking samples at any time during construction, either before or after installation. The Contractor shall furnish casual labor and facilities to provide access to Work being tested, to obtain and handle samples at the site to facilitate inspections and tests and provide for Laboratory's exclusive use storage and curing for test samples. Prior to notice to proceed with construction, the Contractor shall submit a Testing Log of planned tests and scheduled test dates. Tests shall be numbered based on type of Work, type of test, and sequence. The Testing Log shall be maintained by the Contractor and updated weekly. The Contractor shall notify the Owner's Representative in writing at least fourteen calendar days prior to any Work requiring testing. The Contractor shall coordinate, arrange and fully administer to all testing, whether paid by or employed by the Owner or the Contractor.

B. The Contractor shall distribute test results as follows:
   1. Contractor (2 copies)
   2. Architect (2 copies)

C. The final Testing Log, including final acceptable tests, shall be turned over to the Owner, with four copies delivered to the Architect.

D. The Contractor and the Owner will note the test record on the Testing Log to acknowledge test procedures and results. If follow-up or corrective action is needed, the Contractor shall submit to the Owner two written copies of proposed follow-up or corrective plans and obtain the Owner's written approval before proceeding. Costs for additional inspections, sampling and testing required when initial tests indicate Work does not comply with Contract Documents will be deducted from Contractor's monthly payments.
E. FUNCTIONAL PERFORMANCE TESTS

1. Functional testing is to be performed by the Contractor’s testing agency and witnessed by the Commissioning Agent. Testing should be witnessed by the installer and manufacturer, if possible, as referenced in the procedures listed below. The testing procedures are the same as long as the products are all newly installed, and there are no other procedures or methods identified in the Spec by the Architect. In some situations the Installer will perform their own field testing to ensure that their means and methods are suitable to meet the Performance requirements outlined in the Project Specs. This should never replace testing performed by a Contractor retained Independent Testing agency, unless deemed appropriate by the Architect.

2. As a minimum, tests shall be performed on a mock-up installation and at least on one more occasion after 50% completion during production work. Field Testing should be performed for Air Leakage Resistance and Water Penetration Resistance as soon as possible after installation of a mock-up assembly begins and the selected fenestration product is determined to be ready for testing by the installer. If failure occurs, additional testing should be performed to determine the source of the failure and no additional installation should occur until the mock-up assembly meets the Project Requirements.

3. Tests should be performed on a representative type and number of fenestration products at the discretion of the Architect. It is best if testing occurs prior to installation of interior finishes so that all areas around the product being tested may be observed for water leakage, and it makes setting up the test chamber easier and more effective.

1.07 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.
SECTION 02 41 13

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, Labor and Materials as required to complete the following:

1. Remove light fixtures, electrical conduits, wirings, switches, and all related attachments.
2. Remove wood ramp, posts, railings, and all related attachments
3. Remove concrete pad and sonotubes
4. Remove automatic gate opener and all related attachments
5. Remove chain link fence, posts, gate, and all related attachments
6. Remove alarms, communication systems, security cameras, and all related attachments
7. Cut masonry wall as shown on drawings to receive new window and door frames
8. Remove door and all related attachments. Adjust door frame to receive new door
9. Remove plumbing fixtures, hose bibs, scupper, downspouts, drains, and all related attachments
10. Cut wallboard as shown on drawings to match length of existing wood bench.
11. Cut wood bench as shown on drawings
12. Cut metal railings as shown on drawings and re-use existing end cap
13. Cut loading dock as shown on drawings
14. Remove, store, and relocate shelves, office supplies, and furniture
15. The General Contractor shall schedule and sequence operations without interrupt utilities serving occupied areas. If interruption is required, obtain written permission from the utility company and the Owner. Provide temporary services as necessary to serve occupied and usable facilities when permanent utilities must be interrupted, or schedule interruption when the least amount of inconvenience will result.
16. Section 23 00 00 – HVAC is responsible for removing and properly disposing of existing equipment as required to complete their respective Work.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.
B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
2. Section 02 41 13 – Selective Demolition
3. DIVISION 03 – CONCRETE; including all Sections contained therein
4. DIVISION 04 – MASONRY; including all Sections contained therein
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
9. DIVISION 09 – FINISHES; including all Sections contained therein.
10. Section 21 00 00 – Fire Suppression  
11. Section 22 00 00 – Plumbing  
12. Section 23 00 00 - HVAC  
13. Section 26 00 00 – Electrical  
14. DIVISION 31 – EARTHWORK; including all Sections contained therein  
15. Section 32 12 00 – Site Improvements  

1.04 DEFINITIONS  
A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.  
B. Remove and Salvage: Detach items from existing construction and deliver them to the Owner, ready for reuse, at a location designated by the Owner. Protect from weather until accepted by Owner.  
C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated. Protect from weather until reinstallation.  
D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.  

1.05 MATERIALS OWNERSHIP  
A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques, antiques, and other items of interest or value to the Owner that may be encountered during selective demolition remain property of the Owner. Carefully remove each item or object in a manner to prevent damage and deliver promptly to a location acceptable to the Owner.  

1.06 SUBMITTALS  
A. Provide submittals in accordance with requirements of Section 01 30 00 of the Contract Documents  
B. Provide qualification data for demolition firm, professional engineer, and refrigerant recovery technician.  
C. Provide schedule of demolition activities, including but not limited to, the following:  
1. Detailed sequence of demolition and removal work, with starting and ending dates for each activity. Schedule shall ensure that the Owner's building and on-site operations are uninterrupted.  
2. Interruption of utility services, including dates and duration of interruption.  
3. Coordination for shutoff, capping, and continuation of utility services.  
4. Means of protection for items to remain.  
D. Provide an inventory list of items that have been removed and salvaged following completion of the Work of this Section.  
E. Provide photographs and videotapes showing existing conditions of adjoining construction and site improvements, prior to commencement of the Work of this Section that may be misconstrued as damage caused by the Work of this Section.  

1.07 QUALITY ASSURANCE  
A. Examination of Existing Conditions: The General Contractor shall examine the Contract Drawings for demolition and removal requirements and provisions for new work. Verify all existing conditions and dimensions before commencing work. The Contractor shall visit the site and examine the existing conditions as he finds them and shall inform herself/himself of the character, extent and type of demolition and removal work to be performed. Submit any questions regarding the extent and character of the demolition and removal work in the manner and within the time period established for receipt of such questions during the bidding period.  
B. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.
C. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

D. Standards: Comply with ANSI A10.6 and NFPA 241.

E. Pre-demolition Conference: Review methods and procedures related to selective demolition including, but not limited to, the following:
   1. Inspect and discuss condition of construction to be selectively demolished.
   2. Review structural load limitations of existing structure.
   3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
   4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
   5. Review areas where existing construction is to remain and requires protection.

1.08 PROJECT CONDITIONS
A. Owner Occupancy:
   1. The existing New Bedford Police Station Headquarters will be occupied during the Work of this Contract. Insure any impact or disruption to these occupants is kept to a minimum. The General Contractor shall employ all measures necessary to protect the existing buildings and adjacent property from damage caused by the Work of this Contract.

1.09 WARRANTY
A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

1.10 CUTTING AND COREING
A. All new Work that requires cutting and coring of existing floors, walls, and/or roof penetrations measuring 4-1/2 in. or less, shall be performed by the Subcontractor of a Filed Sub-Bid Section. The General Contractor shall cut and core existing floors, walls, and/or roof penetrations for sizes not indicated by the Filed Sub-Bid sections.

1.11 PRE-INSTALLATION MEETING
A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 - PRODUCTS

2.01 GENERAL
A. All Repair materials shall be compatible with existing materials to remain and shall be as approved by the Architect.

PART 3 - EXECUTION

3.01 EXAMINATION
A. Verify that utilities have been disconnected and capped.
B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Designer.

E. Engage the services of a professional engineer registered in the Commonwealth of Massachusetts to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.
   1. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

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

G. Utility Services:
   1. Existing utility services shall be maintained to existing facilities. Provide a minimum three (3) day notice of service shutdown to the Owner.
   2. Shut-off all utilities shall be conducted by the General Contractor in compliance with requirements of authorities having jurisdiction.

H. Site Access and Temporary Controls:
   1. Existing streets and walks shall remain open at all times. Maintain all existing building access and egress capabilities as required by local authorities having jurisdiction
   2. Provide and maintain temporary protection, including chain link fencing as necessary.
   3. Provide and maintain protection around existing trees and plantings located on adjacent property.

I. Temporary Facilities:
   1. Provide and maintain temporary barricades to prevent injury to people.
   2. Provide and maintain temporary weather protection as required.
   3. Provide and maintain protection of existing finish work to remain.
   4. Provide and maintain protection of existing interior furnishings and equipment.
   5. Provide and maintain protection of exterior site improvements to remain, including on adjacent property.

J. Provide and maintain temporary weather-tight enclosure for building exterior as required.

K. Provide and maintain temporary shoring of existing structural building components to remain, including but not limited to, structural steel, brick masonry walls, and concrete floors and wood roof framing.

L. Items to be removed and salvaged shall be cleaned, stored, and transported to the Owner's designated storage area.

M. Items to be removed and reinstalled shall be cleaned, repaired, stored, and reinstalled as required.

N. Existing items to remain shall be protected against damage during construction.

O. Cleaning and Disposal: All waste and debris caused by the Work of this Section shall be legally disposed of off site, daily, at a facility licensed to receive and process building demolition debris. Burning shall not be permitted. Provide original Bills of Lading to the Owner in accordance with requirements of the Owner.

3.02 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   1. Comply with requirements for access and protection in accordance with requirements of Division 01.
   2. Maintain adequate passage to and from all exits at all times. Before any work is done which significantly alters access or egress patterns, consult with the Designer and obtain approval of code required egress. Under no condition block or interfere with the free flow of people at legally required exits, or in any way alter the required condition of such exits.
Selective Demolition

B. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
   1. Strengthen or add new supports when required during progress of selective demolition.
   2. Remove temporary shoring, bracing and structural supports when no longer required.
   3. Post warning signs and place barricades as applicable during placement and removal of temporary shoring.

C. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around demolition area(s).
   1. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction. Provide temporary barricades as required to limit access to demolition areas.
   2. Protect existing site improvements, appurtenances, and landscaping to remain.

D. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with demolition operations.

3.03 SELECTIVE DEMOLITION

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
   1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
   2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
   3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
   4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
   5. Maintain adequate ventilation when using cutting torches.
   6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
   7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
   8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
   9. All waste and debris caused by the Work of this Section shall be removed and legally disposed of daily, in accordance with requirements of Section 01 50 00 - Temporary Facilities and Controls.

B. Removed and Salvaged Items:
   1. Clean salvaged items.
   2. Pack or crate items after cleaning. Identify contents of containers.
   3. Store items in a secure area until delivery to Owner.
   4. Transport items to storage area designated by the Owner.
   5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:
   1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
   2. Pack or crate items after cleaning and repairing. Identify contents of containers.
   3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Designer, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

E. Items for Re-use and Preservation of Existing Surfaces to Remain:
   1. The General Contractor shall inspect closely each item specifically designated to be relocated, re-used, or turned over to the Owner prior to its removal, and immediately report damages and defects to the Designer and Owner. The General Contractor shall be responsible for any subsequent damage to the same other than latent defects not readily apparent from close inspection and shall bear responsibility for its repair or same replacement as directed by the Designer.

F. Unless special surface preparation is specified under other Specification Sections, leave existing surfaces that are to remain in a condition suitable to receive new materials and/or finishes.

3.04 PROTECTION OF PUBLIC AND PROPERTY

A. Provide all measures required by federal, state and municipal laws, regulations, and ordinances for the protection of surrounding property, the public, and workmen during all demolition and removal operations. Measures are to be taken, but not limited to installation of sidewalks, sheds, barricades, fences, warning lights and signs, trash chutes and temporary lighting.

B. Protect all walks, roads, streets, curbs, pavements, trees and plantings, on and off premises, and bear all costs for correcting such damage as directed by the Designer.

C. Demolition shall be performed in such a manner that will insure the safety of adjacent property. Protect adjacent property from damage and protect persons occupying adjacent property from injuries which might occur from falling debris or other cause and so as not to cause interference with the use of other portions of the building, of adjacent buildings or the free access and safe passage to and from the same.

D. Every precaution shall be taken to protect against movement or settlement of the building, of adjacent buildings, sidewalks, roads, streets, curbs and pavements. Provide and place at the General Contractor’s own expense, all necessary bracing and shoring in connection with demolition and removal work.

E. Remove portions of structures with care by using tools and methods that will not transfer heavy shocks to existing and adjacent building structures, both internal and external of the particular work area.

F. Provide and maintain in proper condition, suitable fire resistive dust barriers around areas where interior demolition and removal work is in progress. Dust barriers shall prevent the dust migration to adjacent areas. Remove dust barriers upon completion of major demolition and removal in the particular work area.

3.05 DISCOVERY OF HAZARDOUS MATERIALS

A. If hazardous materials, such as chemicals, asbestos-containing materials, or other hazardous materials are discovered during the course of the work, cease work in affected area only and immediately notify the Designer of such discovery. Do not proceed with work in such areas until instructions are issued by the Designer. Continue work in other areas.

B. If unmarked containers are discovered during the course of the work, cease work in the affected area only and immediately notify the Designer of such discovery. Do not proceed with work in such areas until instructions are issued by the Designer. Take immediate precautions to prohibit endangering the containers integrity. Continue work in other areas.
3.06 CUTTING
   A. Perform all cutting of existing surfaces in a manner which will ensure a minimal difference between the cut area and new materials when patched. Use extreme care when cutting existing surfaces containing concealed utility lines which are indicated to remain and bear full responsibility for repairing or replacement of all such utilities that are accidentally damaged.
   B. Provide a flush saw cut edge where pavement, curb and concrete removals abut new construction work or existing surfaces to remain undisturbed.

3.07 DISPOSAL OF DEMOLISHED MATERIALS
   A. General: Comply with requirements of Division 1, and the following.
      1. Do not allow demolished materials to accumulate on-site.
      2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
      3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
   B. Burning: Do not burn demolished materials.

3.08 CLEANING
   A. Clean adjacent structures and improvements of dust, dirt, and debris caused by the Work of this Section. Premises shall be left in a clean condition and ready to accept alteration work and new construction.

3.09 RUBBISH REMOVAL
   A. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION
SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

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

1.02 DESCRIPTION OF WORK
A. The Work of this Section shall include, but not be limited to, furnishing and installation of the following:
   1. All cast-in-place concrete as shown and noted on the Drawings, including but not limited to, footings, walls, slabs on grade, slabs on deck, stairs, ramps, and other concrete items outside the building.
   2. Curing and sealing agents
   3. Expansion joints, control joints, joint fillers
   4. Sleeves, waterstops, penetration seals

B. Items to be Installed Only: Install the following items as furnished by the designated Sections:
   1. Section 05 52 13 – Steel Handrails and Guardrails: Anchor rods, inserts and pipe sleeves required to attach handrails and guardrails to concrete

1.03 RELATED WORK SPECIFIED ELSEWHERE
A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.
B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following Divisions:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
   2. Section 02 41 13 – Selective Demolition
   3. DIVISION 03 – CONCRETE; including all Sections contained therein
   4. DIVISION 04 – MASONRY; including all Sections contained therein
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
   7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
   8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
   9. DIVISION 09 – FINISHES; including all Sections contained therein.
   10. Section 21 00 00 – Fire Suppression
   11. Section 22 00 00 – Plumbing
   12. Section 23 00 00 - HVAC
   13. Section 26 00 00 – Electrical
   14. DIVISION 31 – EARTHWORK; including all Sections contained therein
   15. Section 32 12 00 – Site Improvements

1.04 INTENT OF WORK
A. Except as specified otherwise herein, concrete shall be batched, mixed, placed, tested, and cured in accordance with the American Concrete Institute's "Structural Concrete for Buildings" ACI 301.
B. Subcontractor shall schedule his Work and notify all trades in ample time so that provision for their Work can be made without delaying the progress of the project.
C. It is the intention of the Drawings and specifications to produce concrete which will present an acceptable finished appearance. Imperfections of material or Workmanship shall be corrected as the Engineer directs, at the Sub-Contractor's expense.

D. All the Work that is to be inserted in the forms for attachment of other Work is not described in detail. Sub-Contractor shall carefully examine all drawings and other Sections of these specifications for the extent and detail of all such Work and coordinate this Work with other trades.

E. It will be the Subcontractor's responsibility to insure that all concrete surfaces are completely free of any conditions which will adversely affect its finished appearance or the application of a specified finish.

F. Failure to comply with these requirements will require removal of sufficiently large Sections of the Work, as determined by the Architect and Engineer, in order to properly integrate the Section to be replaced with the architectural and structural requirements of the total project. All such removal and replacement shall be made at the expense of the Subcontractor at no additional cost to the Owner.

1.05 QUALITY ASSURANCE

A. Except as modified by the requirements specified herein and/or the details on the Drawings, all Work included in this Section shall conform to the applicable provisions of the following codes and standards:

   1. 2015 International Building Code
   3. American Concrete Institute (ACI):


B. Laboratory Tests and Mix Designs

   1. General: Testing of cement and aggregate analysis will be performed by a qualified testing laboratory selected and paid for by the Owner. The laboratory shall perform all tests requested and authorized by the Architect and noted in the statement of special inspections. Tests and services shall consist of the following:
      a. Test results of Portland cement in accordance with ASTM C150 and C114 shall be furnished by the Concrete supplier.
      b. Analysis of aggregates in accordance with ASTM C33, and sieve analysis of fine and coarse aggregates in accordance with ASTM C136.

   2. Samples: Subcontractor shall furnish and deliver identified samples of all materials required for analysis and tests in the amounts required by the Testing Laboratory, without charge. The samples will be selected by the Architect or the Testing Laboratory. Deliver samples of cement and aggregates to the Testing Laboratory at least 30 days prior to use on the job.

   3. Mix Designs:
      a. All mix designs shall be proportioned in accordance with Section 4.4 (trial batches) of ACI 318-95. Cost of mix design preparation shall be paid by the Subcontractor. If trial batches are used, they shall be prepared by a recognized independent testing laboratory approved by the Architect. All mix designs for each class of concrete must be approved by the Architect prior to their use in the project. Sub-Contractor shall be responsible for incorporating into the structure concrete of the minimum strengths specified.
C. Environmental Conditions
   1. Cold Weather Requirements:
      a. Concrete shall not be mixed or placed when the temperature is below 40 degrees F. or when conditions indicate that the temperature will fall below 40 degrees F. within 72 hours, without adequate protection approved by the Architect.
      b. Concrete temperature shall be maintained, when deposited, at not less than 60 degrees F. In cold weather, the reinforcement, forms, and ground which concrete will contact must be completely free of frost.
      c. The concrete and formwork must be kept at a temperature of not less than 50 degrees F. for not less than 72 hours after placing.
   2. Hot Weather Requirements: The maximum placing temperature of the concrete, when deposited, shall be 90 degrees F. If the weather causes the placing temperature to exceed 90 degrees F., the mix shall be cooled by wetting the aggregate or other appropriate method as approved by the Architect.

D. Field inspection and testing of concrete shall be in accordance with Chapter 17 of the Massachusetts State Building Code.

1.06 SUBMITTALS
A. Provide concrete mix design (including admixtures), test reports, mill certification for Portland Cement, certification for Aggregate non-reactivity, ACI certification of concrete plant, and all other required materials in accordance with requirements of this Section and the Contract Documents.
B. Submit shop and erection drawings for reinforcing steel (electronically) and manufacturer’s data for other associated products for Architect’s review.
C. Provide shop drawings for fabricating and placing reinforcing steel. Show all required information for cutting, bending and placing reinforcing bars, and show all accessories and support bars on placing drawings. Indicate suitable marks for placing bars.
D. Fabrication of any material or performing of any work prior to the final approval of the shop drawings will be entirely at the risk of the Contractor.
E. The Contractor is responsible for furnishing and installing materials called for in Contract Documents, even though these materials may have been omitted from reviewed shop drawings.
F. Before being submitted to the Architect, all shop drawings shall be properly checked and coordinated by the Fabricator and by the Contractor and shall be stamped and signed accordingly. Drawings not complying with these requirements will be returned unchecked and stamped, “Not Reviewed”.
G. At least one copy of each approved Shop Drawing shall be kept available in the Contractor’s field office. Drawings not bearing evidence of release for construction by the Architect/Engineer shall not be kept on the job.

1.07 PRE-INSTALLATION MEETING
A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 - PRODUCTS

2.01 CONCRETE
A. Portland Cement: Low alkali ASTM C-150 Type 1 at all exposed concrete. Type I and II elsewhere. All cement of each type shall be from a single source. Cement to have 20% fly-ash with loss on ignition not exceeding 6%, in compliance with ACI 226.3R and ASTM C-618 or up to 25% ACI 226.1R and ASTM C-989 covering blast-furnace slag (grades 100 or 120).
B. Only one color of cement, all of the same manufacturer, shall be used for the Work.

C. Do not use Type III cement without Architect's approval.

2.02 CONCRETE MIX

A. Concrete shall conform to ASTM C94. One copy of the Certificate of Delivery required by ASTM C 94 shall be delivered to the Architect immediately upon arrival of each load of concrete at the site.

B. All concrete shall be proportioned within the following limitations, as indicated in Table A.

<table>
<thead>
<tr>
<th>TABLE A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class of Concrete:</td>
</tr>
<tr>
<td>Min. Compressive Strength @ 7 Days:</td>
</tr>
<tr>
<td>Min. Compressive Strength @ 28 Days:</td>
</tr>
<tr>
<td>U.S. Gallons for 94 Lb. Bags:</td>
</tr>
<tr>
<td>Absolute Ratio by Weight (W/C):</td>
</tr>
<tr>
<td>Consistency Range-Slump(Inches):</td>
</tr>
</tbody>
</table>

* For exposed to weather concrete, the maximum w/c shall be 0.45. Use high-range water reducing admixture for w/c equal to or less than 0.45. For all other concrete with a w/c greater than 0.45, use a mid-range water reducing agent. All Concrete containing the high range water reducing admixture (superplasticizer) shall have a maximum slump of 8” unless otherwise directed by the Architect. All other concrete shall have a maximum slump of 4” for footings and retaining walls, and 5” for other members.

C. The exact proportions for the mix, including amounts of admixture (if any), and water, shall be determined as hereinbefore specified under "Mix Designs", based on cement and aggregates submitted by the Subcontractor, and subject to the approval of the Architect.

D. If greater amounts of cement than those specified above are required because of Subcontractor's operations, such as pumping concrete, no increase in the Contract amount will be permitted for this reason.

E. Air-Entrainment: The air content in all concrete exposed to weathering shall be maintained at 4 to 6 percent for ground level exterior Work. The air content for other concrete exposed to weathering shall be 3 to 5 percent. All interior slabs on grade shall not contain air entraining agent and shall have an air content not exceeding 3 percent.

F. All concrete for slabs on grade shall be placed as controlled concrete. The preparation, delivery, depositing, compaction and curing shall be monitored.

2.03 ADMIXTURES

A. No calcium chloride admixtures are permitted in the concrete.

B. Except as otherwise specified, use of concrete admixtures shall conform to ACI 212.

C. Admixtures employed shall be produced and serviced by established, reputable manufacturer and used in compliance with manufacturer's recommendations.

D. Air entraining agent shall conform to ASTM C 260
   1. When a high range water reducing (HRWR) admixture is used, air-entraining admixture shall be a neutralized vinsol resin solution.
   2. When requested by the Architect, certification attesting to compliance with these specifications shall be furnished.

E. Water reducing agent shall conform to ASTM C 494, Type A.

F. Water reducing agent-retarder shall conform to ASTM C 494, Type D.

G. Superplasticizers: Where permitted by the Architect and where indicated in the approved concrete design mix, a high-range water-reducing (HRWR) admixture (superplasticizers) may be used subject to the following requirements:
1. When a high range water-reducing admixture is used, the air-entraining admixture shall be a neutralized vinsol resin solution.

2. Concrete shall arrive at the job site having a slump conforming to the requirements specified in Paragraph 2.01. HRWR shall be added after the concrete has been thoroughly mixed and the desired initial slump has been achieved.

3. Water to cement ratio shall not exceed 5.0 gallons per hundredweight (0.42 weight basis).

4. Pretesting of the concrete shall be performed under the guidance of the admixture manufacturer's representative to determine dosage, addition times, and compatibility with other admixtures and mixture constituents.

5. HRWR shall be added at the job site and shall be dispensed to the truck mixer using automatic dispensing equipment which accurately measures dosage.

6. Slump after addition of HRWR to concrete shall be no greater than is necessary for proper placement and compaction.

7. Air tests shall be run on the admixed concrete as placed, and air content shall be within the specified limits.

8. Dosage of HRWR admixture shall be as indicated below. Dosage listed is the quantity of admixture recommended per sack of cement when cement content is reduced.

<table>
<thead>
<tr>
<th>Product</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melment</td>
<td>25 fl.oz.</td>
</tr>
<tr>
<td>WRDA-19</td>
<td>15 fl. oz.</td>
</tr>
</tbody>
</table>

2.04 AGGREGATE

A. Except as otherwise noted, aggregate shall conform to ASTM C 33 for normal weight concrete.

B. Maximum size aggregate for Sections 16 in. or greater in thickness shall be 1-1/2 in. Maximum size aggregate for Sections less than 16 in. thick shall be 3/4-in. 3/8” Aggregate may be used for concrete on steel decking.

C. Maximum size of aggregate shall in no case exceed that permitted by ACI 318.

2.05 WATER

A. Water shall conform to ASTM C 94, Section 4.1.3.

2.06 GROUT

A. Grout shall be mixed in the proportions of one part Portland cement to two parts sand, by volume. Only sufficient water shall be used to enable grout to barely hold its shape when squeezed into a ball in the hand. Sand for grout shall be ASTM C 33 Fine Aggregates.

B. Non-shrink grout shall be pre-mixed non-shrinking, high strength grout. Compressive strength in 28 days shall be 5,000 psi minimum, but in no case less than the specified strength of the adjacent concrete. Manufacturer shall provide evidence that the material meets the requirements of the COE CRD-C 621 (558). Grout permanently exposed to view shall be non-oxidizing; metallic grout may be used in other locations.

2.07 CURING AND SEALING AGENTS

A. Curing and sealing agents shall be compatible with applied floor finishes. Coordinate Work with requirements of Section 09 91 13 – Painting for application of colored floor sealer. Do not use curing / sealer on floors planned to receive flooring / finishes.

2.08 EXPANSION JOINTS

A. Expansion joints (or compressible fillers) shall be 1/2 in. wide and shall be filled with preformed joint filler. Filler shall be a preformed, non-bituminous type joint filler conforming to ASTM D 1752, Type II, Sealight Cork Expansion Joint Filler, as manufactured by W.R. Meadows, Inc., or Architect approved equal.
1. Joint filler shall be one piece for the full depth and width of the joint. Use of multiple pieces of lesser dimensions to make up the required depth and width of the joint will not be permitted.

B. Unless otherwise indicated on the Drawings, expansion joints shall be located 30 ft. o.c., maximum.

C. Where indicated on the Drawings, expansion joints shall be doweled.
1. Steel dowels shall be greased on one end; plastic-coated dowels will not require greasing.

2.09 CONTROL JOINTS

A. Control joints shall be saw cut with diamond blade concrete that cuts into concrete slab surface at least 1 in., but not less than 25% of slab depth.

B. Unless otherwise indicated on the Drawings, control joints at interior slabs-on-grade shall be located 12’ – 6” O.C., maximum. At exterior sidewalk slabs, joints shall not exceed 6’-0” O.C.

C. Reinforcing shall continue through control joints.

D. At sidewalk slabs, provide formed joints.

2.10 WATERSTOPS

A. Provide Hydrophilic, expanding butyl rubber waterstop, HF302 Hydro-Flex, as manufactured by Henry Inc., or Architect approved equal. Waterstop shall be preformed adhesive hydrophilic waterstop designed to swell in the presence of water, providing a watertight seal in cold joints on concrete structures. Material shall be a composite of butyl rubber, polypropylene elastomers, and a mixture of hydrophilic bentonite and hydrophobic fillers and plasticizers complying with Federal Specification SSS-210.

2.11 SLEEVES

A. Sleeves shall be galvanized steel Schedule 40 conforming to ASTM A53 or schedule 40 PVC.

2.12 PIPE TO WALL PENETRATION SEALS

A. Pipes passing through waterproof surfaces shall have a pipe to wall penetration seal assembly equal to Link-Seal, manufactured by Thunderline Corporation or approved equal.
1. Each pipe seal shall be furnished complete with wall sleeve and wall penetration seal.
2. Wall sleeve shall be steel and shall have integral waterstop and anchor collar.
3. Wall penetration seal shall be a modular mechanical type, with interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and the wall sleeve.
4. Service designation shall be Type “S” for corrosive service with glass reinforced nylon plastic pressure plate, stainless steel bolts and nuts, and EPDM rubber sealing element.

B. All other pipes passing through concrete not indicated to be waterproofed shall have only the wall sleeve Model WS. Sealing of these pipes is not required.
1. Other pipe sleeve material other than the Link-Seal will be considered subject to the approval of the Architect.

C. Pipe sleeves and seals shall be properly sized in accordance with the sleeve manufacturer’s recommendations to ensure a completely watertight seal upon completion of the installation.

2.13 CONTROL JOINT FILLER

A. Provide control joint filler as follows, and as approved by the Architect:
1. Urethane joint filler: Pourthane by W.R. Meadows
2. Epoxy joint filler: Sikadur 5 INS/SC by Sika
2.14 MISCELLANEOUS ITEMS

A. Welded deformed Bar Anchors: Gun-applied.
B. Headed Stud Anchors: Headed studs welded by full-fusion process.
C. Bolts: Conform to ASTM A 307, carbon steel with regular hexagon nuts conforming to ASTM A 563, and carbon steel washers conforming to ASTM F 436.
D. Weepholes: Schedule 40 PVC pipe.

PART 3 - EXECUTION

3.01 CONCRETE MIXING

A. All concrete shall be ready-mixed concrete and shall be mixed and delivered in accordance with the requirements of "Specifications for Ready-Mixed Concrete", ASTM C94 to produce concrete with the required slump and air content.
B. The concrete producer shall furnish with each load of concrete a numbered delivery ticket showing name of Contractor, name and location of project, date and time batched, truck number, number of cubic yards in load, specified strength, slump, and mix design number.
C. In the event concrete is mixed at a central batching plant, the delivery shall be arranged so that intervals between batches are kept at a minimum, and in any event not more than thirty (30) minutes. Trucks shall be in first class condition and kept in constant rotation during delivery.
D. When concrete is delivered in a truck mixer or agitator, no water from the truck-water system or elsewhere shall be added after the initial introduction of mixing water for the batch, except when on arrival at the job site the slump of the concrete is less than that specified. Such additional water to bring the slump within required limits shall be injected into the mixer. The drum or blades shall be turned an additional 30 revolutions or more at mixing speed until the concrete is within the proper slump limits if not in violation of the requirements of Paragraph 5.
E. Discharge of concrete after initial batching shall be completed within 90 minutes, or before the drum has revolved 300 revolutions, whichever comes first, after the introduction of the mixing water to the cement and aggregates or the introduction of the cement to the aggregates. In hot weather (as defined by ACI) the discharge of the concrete shall be completed within 60 minutes.

3.02 CONCRETE PLACEMENT

A. Before placing concrete, forms and space to be occupied by concrete shall be thoroughly cleaned, and reinforcing steel and embedded metal shall be free from dirt, oil, mill scale, loose rust, paint, and other material which might tend to reduce bond. The geotechnical engineer shall review the subgrade material prior to the placement of concrete, forms, and rebar.
B. Existing concrete, earth, and other water-permeable material against which new concrete is to be placed shall thoroughly damp when concrete is placed. There shall be no free water on surface.
C. Concrete which has set or partially set before placing shall not be employed. Re-tempering of concrete will not be permitted.
D. Segregation of the concrete shall be prevented during handling; should any segregation occur, the concrete shall be remixed before it is placed. Concrete shall be placed in the forms in horizontal layers not over 1 to 2 ft. thick. Concrete shall not be allowed to drop freely more than 4 ft. If the free drop to the point of placement must exceed 4 ft., the Contractor shall obtain the approval of the Architect for the proposed method of depositing the concrete. The concrete shall not be required to flow over distances greater than 3 ft. in any direction in the forms or on the ground, unless otherwise permitted by the Architect.
E. Concrete shall be thoroughly spaded, and tamped, and vibrated to secure a solid and homogeneous mass, thoroughly worked around reinforcement and into corners of forms.
F. Provide concrete where required for filling of miscellaneous site improvements provided under the Work of Section 05 50 00 – Metal Fabrications, including but not limited to, ornamental fencing, steel bollards, and vehicle gates.

3.03 TESTING OF CONCRETE

A. Field Inspection and Testing shall be in accordance with the testing program requirements of Chapter 17-Special Inspections of the Massachusetts State Building Code.

B. Slump Tests: The Testing Laboratory will make slump tests of concrete during placing of concrete in accordance with ASTM C143. Air content shall be tested in accordance with requirements of the Statement of Special Inspections. Slump test shall be made for each set of test cylinders or as noted on the Contract Drawings.

C. Compression Tests:
   1. The Testing Laboratory will prepare and cure compression test samples at the Owner's expense. One set of at least four cylinders will be made in accordance with ASTM C31 from each 50 cubic yards of concrete, or fraction thereof, placed each day. Additional cylinders required by the Contractor for the early removal of forms shall be made at the Contractors expense.
   2. One cylinder from each set will be tested at 7 days for information. Two cylinders shall be tested at 28 days for acceptance in accordance with ASTM C39.
   3. The fourth cylinder from each set shall be kept until the 28 day test reports on the second and third cylinders in the same set has been received by the Architect.
   4. The strength level shall be considered satisfactory so long as the averages of all sets of three consecutive strength test results equal or exceed the specified strength fc', and no individual strength test result falls below the specified strength fc' by more than 500 psi.
   5. In the event the average compressive strength of the two 28 day cylinders does not achieve the required level, the Architect may elect to test the fourth cylinder immediately or test it after 56 days.
   6. In the event that the result is below the required level, the Architect may require test cores of the hardened structure to be taken by the Testing Laboratory in accordance with ASTM C42. If such test indicates that the core specimen is below the strength level required by ACI 318-95, Chapter, the concrete in question shall be removed and replaced without cost to the Owner. Any other Work damaged as a result of this concrete removal shall be replaced with new materials to the satisfaction of the Architect at no additional cost to the Owner. The cost of coring will be deducted from the Contract amount. Where core cylinders have been taken by the Testing Laboratory and the concrete proves to be satisfactory, the cutout Sections shall be restored to the original condition in a manner satisfactory to the Architect at no additional cost to the Owner.

3.04 SUBMITTAL OF CONCRETE TEST REPORTS

A. Concrete test reports submitted by the testing laboratory shall contain the following information:
   1. Name and location of project
   2. Name of Architect/Engineer
   3. Name of Contractor
   4. Name of concrete producer
   5. Delivery ticket number
   6. Date and time batched
   7. Date and item sampled, with identification number or letter for each specimen
   8. Temperature of concrete
   9. Temperature of air
   10. Slump
   11. Air content and unit weight of concrete
   12. Mix reported used
   13. Approximate number of cubic yards represented by sample
   14. Location or portion of structure represented by sample
   15. Description of initial curing of test specimens
   16. Date of test and age of specimen
17. Compressive strength PSI
18. Statement signed by laboratory supervisor that all applicable ASTM Standards performed by the laboratory have been followed, except as noted.

3.05 CONVEYING AND PLACING CONCRETE

A. Notification: The Engineer shall be notified at least 72 hours in advance of the placing of any concrete.

B. Foundation bearing area under footings and slabs shall be approved by the Testing Agency before placing concrete.

C. Forms: Before placing concrete, forms shall be thoroughly inspected. All chips, dirt, and other foreign matter shall be removed, all temporary bracing and cleats taken out, all openings for pipes, sleeves, and other similar related penetrations shall be properly boxed, all forms properly secured in their correct position and made tight, all reinforcements, anchors, and embedded items secured in their proper places. Concrete which may be on the forms or reinforcement, and which is set and dry, shall be cleaned off, and the forms and steel washed off before proceeding. Remove water and all foreign matter from forms and excavations. Unless otherwise directed, sand or sandy soil shall be moist but not saturated just prior to placing concrete.

1. To permit satisfactory finishing, forms shall be removed from the vertical faces of the concrete without damaging the surface. Immediately after stripping forms, any fins or projections left by the forms will be chipped off, and the surfaces rubbed smooth.

2. Form tie holes and other voids and faults shall be patched. All voids, faults, honeycombs, and similar surface deficiencies shall be cleaned out, roughened, thoroughly wetted, coated with neat cement paste, and filled with mortar of cement and sand in the same proportions, materials, and color as used in the concrete. The surface of the patch shall be flush with the surrounding surface after finishing operations are complete. Surface shall be kept continuously damp until patches are firm enough to be rubbed without damage.

3. Rubbing shall be performed while the surface is wet using a carborundum or cement sand brick, to achieve a smooth, uniform, even textured finish. Patched and chipped areas shall be blended to match as closely as possible the appearance of the rest of the surface. No cement wash or plastering will be permitted, and no mortar shall be used except in accordance with requirements of the Contract Documents.

D. Vertical surfaces of concrete which will be concealed in finished structure shall be formed to produce a "rough form finish", as defined in ACI 301.

E. Vertical surfaces of concrete which will be exposed in finished structure shall be formed to produce a "smooth formed -rubbed finish", as defined in ACI 301.

3.06 CONCRETE SLAB FINISHES

A. All interior slabs surfaces shall be screeded, leveled, floated and steel troweled. Mechanical troweling machines may be used if the desired finish and level tolerances can be obtained by their use, but finishing shall be by hand troweling at edges and areas inaccessible to machine trowels.

1. Scratch Finish: Apply scratch finish to monolithic slab surfaces to receive concrete floor topping or mortar setting beds for tile, Portland cement terrazzo, and other bonded applied cementitious finish flooring material, and where indicated.

   a. After placing slabs, finish surface to tolerances of F 38 (floor flatness) and F 25 (floor levelness) measured in accordance with requirements of ASTM E 1155. (Note: F 25 applies to slabs-on-grades only – not suspended / elevated slabs.) Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set with stiff brushes, brooms, or rakes.

2. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or epoxy terrazzo, and where indicated.
a. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Finish surfaces to tolerances of Fr 38 (floor flatness) and F1 25 (floor levelness) measured in accordance with requirements of ASTM E 1155. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture. (Note: F1, 25 applies to slabs-on-grades only – not suspended / elevated slabs.)

3. Trowel Finish: Apply a trowel finish to monolithic slab surfaces exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or thin-set quarry tile, paint, or another thin film-finishing coating system.

a. After floating, begin first trowel-finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and finish surfaces to tolerances of Fr 50 (floor flatness) and F1 33 (floor levelness) measured in accordance with requirements of ASTM E 1155. Grind smooth any surface defects that would telegraph through applied floor covering system. (Note: F1, 33 applies to slabs-on-grades only – not suspended / elevated slabs.)

b. 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 1/8”.

B. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply a trowel finish as specified, then immediately follow by slightly scarifying the surface with a fine broom.

C. Non-slip Broom Finish: Apply a non-slip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

D. Non-slip Aggregate Finish: Apply non-slip aggregate finish to concrete stair treads, platforms, ramps, sloped walks.

1. After completing float finishing and before starting trowel finish, uniformly spread 25 lbs. of dampened non-slip aggregate per 100 sq. ft. of surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface. After broadcasting and tamping, apply trowel finishing as specified.

2. After curing, lightly work surface with a steel wire brush or an abrasive stone, and water to expose non-slip aggregate.

E. The addition of cement, sand, water, or mortar to slab surfaces while finishing concrete is strictly prohibited.

F. All surfaces shall be finished to the tolerances noted above. Particular care shall be taken to finish troweling around the edges of the slabs so finish surface at edges shall be at same elevations as the rest of the top surface of the slab.

G. Slabs shall be laid to temporary screeds set level at the proper elevations. Screeds to be pipe or metal. Wet screeds will not be allowed. Screeds shall be set no further apart than 12'-0" on center.

H. Mark-off lines shall be formed with curved edging tool, neat and true to line, uniform throughout. Conform to markings shown on Drawings.

I. Immediately following finishing operations, arrises at edges and both sides of expansion joints shall be rounded to a 1/4 in. radius. Control joints shall be scored into slab surface with scoring tool. Adjacent edges of control joint shall at same time be finished to a 1/4 in. radius.

J. Where finishing is performed before end of curing period, concrete shall not be permitted to dry out, and shall be kept continuously moist from time of placing until end of curing period, or until curing membrane is applied.

3.07 CONTROL JOINTS

A. Control joints in slab surfaces shall be located as shown on the Contract Drawings. Control joints may be made by sawing a continuous slot to a depth of 1/4 the thickness of the slab. Joints shall be spaced at intervals indicated on Contract drawings and shall be made in the concrete slabs-on-grade within 24 hours after placement of concrete.
B. Control joints and/or construction joints in walls shall be spaced at 40'-0" O.C. maximum and shall align with masonry control joints where applicable. Joints shall be made with a 1/2" deep chamfer strip on each face of the walls.

3.08 FILLING TIE ROD AND BOLT HOLES
A. Holes resulting from the removal of bolts or tie rods shall be solidly filled with cement grout. Holes passing entirely through concrete members shall be filled from the inside face, with a plunger-type grease gun or other device that will force the mortar through to the outside face, holding a piece of canvas at the exterior surface to assure complete filling. Holes which do not pass entirely through shall be filled, using tools which will permit the opening to be packed thoroughly full. Excess mortar at the faces of filled holes shall be struck off flush, with canvas.

3.09 CURING
A. It is essential that concrete be kept continuously damp from time of placement until end of specified curing period. It is equally essential that water not be added to surface during floating and troweling operations, and not earlier 24 hours after concrete placement. Between finishing operations surface shall be protected from rapid drying by a covering of waterproofing paper. Surface shall be damp when the covering is placed over it, and shall be kept damp by means of a fog spray of water, applied as often as necessary to prevent drying, but not sooner than 24 hours after placing concrete. None of the water so applied shall be troweled or floated into surface.

B. Concrete surfaces, not otherwise specified, shall be cured by being kept wet with clean water for a period of not less than seven days after placing. Each day the forms are left in place, and kept wet enough to prevent the opening of joints in the forms and the drying out of the concrete, will be counted as one day of curing.

C. Concrete surfaces shall be cured by completely covering with curing paper or by use of a curing compound.
1. Concrete cured using curing paper shall be completely covered with paper with seams lapped at least 2 in. and sealed with tape. Concrete surface shall not be allowed to become moistened within 24 hours of placing concrete. During curing period, the surface shall be checked frequently, and sprayed with water or curing compound, as applicable, as often as necessary to prevent drying, but not sooner than 12 hours after placing concrete.
2. Concrete cured with a curing compound shall have curing compound applied at a rate of 200 sq. ft. per gallon. A second coat of the specified curing and sealing compound shall be applied to all exposed concrete slab.
3. Concrete surfaces to receive paint, waterproofing, damproofing, thin-set adhesives and coatings, and similar applied materials which require bond and adhesion to concrete surfaces, shall be cured using curing paper. The use of curing compounds on these surfaces will not be permitted.
4. Concrete surfaces in apparatus bay that will be shot blasted and receive epoxy coatings shall be treated in accordance with manufacturer’s recommendations.
5. Unless otherwise directed by the Architect, curing period shall be seven days, minimum.

3.10 COLD WEATHER CONCRETING
A. Materials for concrete shall be heated when concrete is mixed, placed, or cured when the mean daily temperature is below 40 degrees F., or is expected to fall to below 40 degrees F., within 72 hours, and the concrete after placing shall be protected by covering, heat, or both.

B. Details of handling and protecting of concrete during freezing weather shall be subject to the approval and direction of the Architect. Procedures shall be in accordance with provisions of ACI 306.

3.11 HOT WEATHER CONCRETING
A. Concrete just placed shall be protected from the direct rays of the sun and the forms and reinforcement just prior to placing shall be sprinkled with cold water. Every effort shall be made to minimize delays which will result in excessive mixing of the concrete after arrival on the job.

B. During periods of excessively hot weather (95 degrees F. or above), ingredients in the concrete shall be cooled insofar as possible and cold mixing water shall be used to maintain the temperature of the concrete at permissible levels, all in accordance with the provisions of ACI 305. Any concrete with a temperature above 95 degrees F., when ready for placement, will not be acceptable and will be rejected.
C. Temperature records shall be maintained throughout the period of hot weather, including but not limited to, air temperature, general weather conditions, ie: wind speed, velocity, and direction, clear or cloudy, and relative humidity. Records shall include checks on temperatures of concrete as delivered and after placing in forms. Data should be correlated with the progress of the Work so that conditions surrounding the construction of any part of the structure can be ascertained.

3.12 BRACING AND SUPPORT
A. Concrete members shall be adequately and safely supported and braced until the permanent supports and braces (by whomever supplied) are installed.

3.13 REMOVING FORMS AND SUPPORTS
A. Except as otherwise specifically authorized by the Architect, forms shall not be removed until the concrete has aged for at least three days or the following number of day-degrees, whichever is greater. Form removal by methods other than day-degree method will not be permitted.

<table>
<thead>
<tr>
<th>Location</th>
<th>Day-Degrees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beams and Slabs</td>
<td>500</td>
</tr>
<tr>
<td>Walls and Vertical Surfaces</td>
<td>100</td>
</tr>
</tbody>
</table>

* The term day-degrees represents the product of the number of days elapsed since time of concrete placement and the average daily air temperature at the surface of the concrete. For example, five days at a daily average temperature of 60 degrees F. equals 300 day-degrees.

B. Shores under beams and slabs shall not be removed until the concrete has attained at least 75 percent of the specified cylinder strength and also sufficient strength to support safely its own weight and the construction loads upon it.

3.14 EXPANSION JOINT
A. Expansion joint shall be 1/2 in. wide, clean, dry, and free of loose material, dirt, oil and grease, and shall be formed in the concrete to required width with preformed joint filler in place. Joint filler shall extend the full length of the expansion joint.
   1. Depth of filler shall extend to the full thickness of the concrete in vertical surfaces and in concealed horizontal surfaces.
   2. Depth of filler in exposed horizontal surfaces shall form a 1/2 in. deep sealant recess below finished surface.

3.15 SAW CUT JOINT
A. Saw cut joints shall be made following finishing as soon as the concrete surface is firm enough not be torn or damaged by the blade, (within 24 hours after placement), and before random shrinkage cracks can form in the concrete surface.

B. Saw cut shall be made accurately to the dimensions, line, and spacing indicated.

3.16 INTERIOR JOINTS OF SLAB ON GRADE
A. All interior construction and control joints, where noted on the Drawings, shall be filled with the specified epoxy joint filler or urethane joint sealer. These compounds shall be mixed and installed in strict accordance with the directions of the manufacturer.

B. The epoxy joint filler shall not be installed until 90 days after slab placement.

3.17 EXTRUDED POLYSTYRENE FOAM INSULATION
A. Individual insulation panels shall be placed staggered wall-to-wall with a minimum of 1 ft. – 0 in. overlap at all joints and no gaps wider than ¼ in., from 16 to 20 inches in overall depth and exposed leading edges tapered at 45 degrees.
3.18 PROTECTION OF CONCRETE SURFACES
A. Concrete and insulating concrete surfaces shall be protected from traffic or damage until surfaces have hardened sufficiently. If necessary, 1/2 in. thick plywood sheets shall be used to protect the exposed surface.

3.19 DEFECTIVE WORK
A. The following Work will be considered defective and may be ordered by the Architect to be removed and replaced at no additional cost to the Owner:
   1. Concrete incorrectly formed
   2. Concrete not plumb or level
   3. Concrete not achieving specified strength
   4. Concrete containing rock pockets, voids, honeycomb, or cold joints
   5. Concrete containing wood or foreign matter
   6. Concrete otherwise not in accordance with requirements of the Contract Documents

3.20 REPAIR OF DEFECTIVE AREAS:
A. Immediately after stripping forms, patch minor defects, including but not limited to form-tie holes, voids, faults, honeycombing, and similar related surface deficiencies, before concrete is thoroughly dry. Remove ledges and bulges. Repair gravel pockets by cutting out to solid surface, form key, and thoroughly dampen. Apply the specified bonding compound. Place patching mortar consisting of 1-part cement to 2 parts fine sand, after the bonding compound has dried. Compact fine sand, after the bonding compound has dried. Compact mortar into place and neatly finish to exactly match surface texture. Grind or fill surfaces to produce level, true planes. Patching of honeycombed areas to gravel pockets which, in the Architect's opinion, are too large and unsatisfactory for mortar patching as described above, is to be cut out to solid surface, keyed, and packed solid with matching concrete to produce firm bond and surface. Patching shall match adjacent surfaces.
   B. All structural repairs shall be made with an epoxy adhesive or mortar specified by the Structural Engineer of Record thru the administration of the Architect for the type of repair required.

3.21 AS-CAST FORMED FINISHES
A. Vertical surfaces of concrete concealed in finished structure shall be formed to produce a "rough form finish", as defined in ACI 301. Vertical surfaces of concrete exposed in finished structure shall be formed to produce a "smooth formed - rubbed finish", as defined in ACI 301.
   B. Provide a smooth-formed finish as imparted by the approved form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Remove fins and other projections exceeding specified limits on formed-surface irregularities. Repair and patch tie holes and defects.
   C. Not later than one day after form removal, at areas of exposed architectural concrete as indicated on the Drawings, moisten concrete surfaces and rub with carborundum brick or another approved abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
   D. Install pre-manufactured concrete formliners in accordance with the approved manufacturer's written requirements at locations and in patterns as indicated on the Drawings or otherwise approved on-site by the Architect.

3.22 RUBBISH REMOVAL
A. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION
SECTION 03 31 00

CONCRETE FORMWORK

PART 1 - GENERAL

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

1.02 DESCRIPTION OF WORK
   A. The Work of this Section shall include all Work necessary and required to complete the Work as indicated, including but not limited to, the following:
      1. All concrete formwork necessary and required for the construction of the Project, as indicated
      2. Furnishing and installing of forms for all cast-in-place concrete Work
      3. Removal of forms at completion of concrete Work
      4. Obtain and pay all local and/or state approvals including necessary permits.

1.03 RELATED WORK SPECIFIED ELSEWHERE
   A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.
   B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following Divisions:
      1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
      2. Section 02 41 13 – Selective Demolition
      3. DIVISION 03 – CONCRETE; including all Sections contained therein
      4. DIVISION 04 – MASONRY; including all Sections contained therein
      5. DIVISION 05 – METALS; including all Sections contained therein.
      6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
      7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
      8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
      9. DIVISION 09 – FINISHES; including all Sections contained therein.
     10. Section 21 00 00 – Fire Suppression
     11. Section 22 00 00 – Plumbing
     12. Section 23 00 00 - HVAC
     13. Section 26 00 00 – Electrical
     14. DIVISION 31 – EARTHWORK; including all Sections contained therein
     15. Section 32 12 00 – Site Improvements

1.04 QUALITY ASSURANCE
   A. All concrete formwork included in this Contract shall conform to the applicable requirements of ACI 301, 318 and 347.

1.05 SUBMITTALS
   A. Provide large scale shop drawings and manufacturer’s product data sheets for materials and methods required to complete the Work of this Section.
1.06 PRE-INSTALLATION MEETING
   A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 - PRODUCTS

2.01 MATERIALS
   A. Plywood forms when used for concrete Work shall conform to the U.S. Product Standard PS I. for "Plyform" Class I or II and shall be a minimum of 5/8 inch thick.
   B. Metal forms of sufficient strength may be used in lieu of plywood forms.
   C. Control joints shall be standard metal keyed dividers for cold joints, subject to approval of the Architect.
   D. Form ties and spreaders shall be standard metal form clamp assembly, of type acting as spreaders and leaving no metal within 1 inch of concrete face. Inner tie rod shall be left in concrete when forms are removed. Submit samples and manufacturer’s specifications to the Architect for approval before using. No wire ties or wood spreaders will be permitted.
   E. Anchors and hangers used for exposed concrete shall not leave exposed metal at surface.
   F. Form coating shall be non-grain raising and non-staining type that will not leave residual matter on surface of concrete or adversely affect proper bonding of subsequent application of other material applied to concrete surface (such as waterproofing or flooring adhesives). Coatings containing mineral oils or other non-drying ingredients will not be permitted. Acceptable manufacturers: Symons Corp., Superior Manufacturing Corp., Burke Concrete Accessories or an approved equal.

PART 3 - EXECUTION

3.01 CONSTRUCTION OF FORMS
   A. Forms shall be constructed of sound material, shall be of the correct shape and dimensions, mortar tight, of sufficient strength, and so braced and tied together that the movement of men, equipment, materials, or placing and vibrating the concrete will not throw them out of line or position. Forms shall be strong enough to maintain their exact shape under all imposed loads. Camber where necessary to assure level finished soffits. Forms shall be so constructed that they may be easily removed without damage to the concrete. Before concrete is placed in any form, the horizontal and vertical position of the form shall be carefully verified and all inaccuracies corrected. All wedging and bracing shall be completed in advance of placing of concrete.
   B. Framing, bracing, supporting members, and centering shall be of ample size and strength of safely carry, without deflection, all dead and live loads to which forms may be subjected, and shall be spaced sufficiently close to prevent any bulging or sagging of forms. Distribute bracing loads over base area on which bracing is erected. When placed on ground, protect against undermining or settlement.
   C. Tolerances:
      1. Variation from plumb in lines and surfaces of walls, and arises shall not exceed 1/8 inch in 10 feet with maximum "in" and "out" variation occurring in not less than 20 feet.
      2. Variation in linear building lines from established position of columns, piers, or walls shall not exceed 1/2 inch in any bay of 20 feet or 1 inch in 40 feet or greater length.
   D. Form ties shall be of sufficient strength and used in sufficient quantities to prevent spreading of the forms. Ties shall be placed at least 1 inch away from the finished surface of the concrete. The use of ties consisting of twisted wire loops will not be permitted. Inner rods shall be left in concrete when forms are stripped.
E. Provide removable cleanout Sections or access panels at the bottom of all forms to permit inspection and effective cleaning of loose dirt, debris, and waste material. All forms and surfaces to receive concrete shall be cleaned of all chips, sawdust, and other debris and shall be thoroughly blown out with compressed air just before concrete is placed.

F. Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.

G. Provide a surfaced pouring strip where construction joints intersect exposed surfaces to provide straight line at joints. Just prior to subsequent pour, remove strip and tighten forms to conceal shrinkage. Construction joints shall show no "overlapping" of concrete and shall, as closely as possible, present the same appearance as butted plywood joints. Joints in a continuous line shall be straight, true and sharp.

H. Embedded items shall conform to requirements of ACI Building Code - Section 503. Provisions shall be made for pipes, sleeves, anchors, embedments, inserts, reglets, anchor slots, nailers, waterstops, and other features. No wood other than necessary nailing blocks shall be embedded in concrete. Complete cooperation shall be extended suppliers of embedded items in their installation. Secure all information and specific components required to be embedded items from other trades allowing adequate and sufficient time for coordination and placement and embedment. All embedded items shall be securely anchored in correct location and alignment prior to placing concrete. Electrical and telephone conduits shall be run in concrete only upon the written approval of the Architect. Under no circumstances will aluminum conduit be permitted in concrete. No electrical or telephone conduit larger than 3/4 inch in diameter and no plumbing pipes of any size will be permitted in concrete walls or slabs. The following applies to conduits, pipes, and sleeves which may be embedded in concrete. Sizes refer to outside diameter.

1. Pipes shall not be coated with paint or enamel or otherwise except galvanizing, sherardizing or their approved equivalent.
2. Reinforcing shall not be cut or displaced from its indicated position to accommodate pipes; in particular pipes shall not be placed between forms and bottom slab rods, or above top slab rods.
3. In slabs pipes shall not be larger than 1/4 the slab or wall thickness and shall be placed and kept within the middle two quarters of that thickness.
4. Pipes larger than 1/6 the slab or wall thickness shall be run roughly parallel and at right angles to the reinforcing, not diagonally.
5. Pipes nearly parallel shall be spaced at least three diameters on centers.
6. Pipes shall not be embedded lengthwise in beams or columns.

I. Frame openings in concrete where indicated on architectural, structural, plumbing, mechanical, or electrical drawings. Subcontractor shall establish exact locations, sizes, and other conditions required for openings and attachment of Work specified under other Sections. Subcontractor shall be held responsible for proper coordination of all Work of this nature in order that there will be no unnecessary cutting and patching of concrete. Any cutting and repairing to concrete required as result of failure to provide for such openings shall be paid for by the Subcontractor at no additional expense to the Owner.

J. Variation from these Specifications as to size and placement of openings or embedded pipes, size and arrangement of sleeves, may be made in specific cases upon written approval by the Architect. Such approval will be given on request when the safety of the building and conformity to the Building Code allow. Request shall be made in writing accompanied by sketch or adequate description of what is desired.

K. Straight edges shall be checked with a taut line regularly and spares shall be available in case any bowing becomes evident.

L. Care shall be exercised that no weight be placed on the straight edge and that it will always be cleaned and laid flat when not in use.

M. Thoroughly clean forms and recoat with specified form coating before each reuse. Do not reuse any form for exposed Work which cannot be reconditioned to "like new" condition. Discard forms considered unsatisfactory by the Architect. Apply form coating to all forms in accordance with the manufacturer's specifications. Apply form coatings before placing reinforcing steel.
N. Prior to placing of any concrete, and after placement of reinforcing steel in the forms, Subcontractor shall notify the Architect so that proper inspection may be made. Such notification shall be made at least 72 hours in advance of placing concrete to permit proper arrangements to be made for inspection.

O. Any movement or bellying of forms during construction or variations in excess of the tolerances specified will be considered just cause for rejection and removal of such forms and concrete Work so affected. Reconstruction of forms and new concrete shall be furnished at no additional cost to the Owner.

3.02 REMOVAL OF FORMS AND SHORES

A. The supporting forms shall not be removed until the members have acquired sufficient strength to support their weight and the loads superimposed thereon safely. In no case may any forms be removed until the time and sequence has been approved by the Architect. Earlier removal than specified below may be approved by the Architect, based on the weather and tests of job-cured cylinders. All formwork shall be removed without damage to the concrete.

B. The minimum time for forms to remain in place shall be as follows:
   1. Walls, columns, and beam sides: 4 days.
   2. Slabs on grade and sides of footings: 3 days.

C. Any request for earlier removal of forms and shoring shall be made to the Architect in writing, along with supporting evidence that the safety of the structure will not be impaired. Subcontractor shall prepare test cylinders in accordance with ASTM C31 and have compression tests performed in accordance with ASTM C39, at his own expense, as supporting evidence for earlier form removal, if required by the Engineer.

D. During the period that forms are in place on the concrete Work, said forms shall be kept wet at all times.

E. In removing plywood forms, no metal pinch bars shall be used and special care shall be taken in stripping. Start at top edge or vertical corner where it is possible to insert wooden wedges. Wedging shall be done gradually and shall be accompanied by light tapping on the plywood panels to crack them loose. Do not remove forms with a single jerk after it has been started at one end.

F. Forms shall be left in place as long as possible to permit shrinkage away from concrete.

G. Nothing herein shall be construed as relieving the Contractor of any responsibility for the safety of the structure.

H. After stripping, Subcontractor shall properly protect all concrete to be exposed in the finish Work from damage to prevent spalled edges, chips, etc.

3.03 RUBBISH REMOVAL

A. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION
SECTION 03 31 13
CONCRETE REINFORCING

PART I – GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:

1. All work necessary to provide all concrete reinforcement such as reinforcing steel, welded wire fabric, and concrete inserts as called for on the Drawings and as specified herein.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following Divisions:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
2. Section 02 41 13 – Selective Demolition
3. DIVISION 03 – CONCRETE; including all Sections contained therein
4. DIVISION 04 – MASONRY; including all Sections contained therein
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
9. DIVISION 09 – FINISHES; including all Sections contained therein.
10. Section 21 00 00 – Fire Suppression
11. Section 22 00 00 – Plumbing
12. Section 23 00 00 - HVAC
13. Section 26 00 00 – Electrical
14. DIVISION 31 – EARTHWORK; including all Sections contained therein
15. Section 32 12 00 – Site Improvements

1.04 REFERENCES

A. American Concrete Institute (ACI)

1. ACI 315: Details and Detailing of Concrete Reinforcement, Latest Edition.

B. American Society for Testing and Materials (ASTM):


C. American Welding Society (AWS):


1.05 SUBMITTALS
A. Provide shop drawings as follows:
   1. Shop drawings for reinforced concrete structures shall be submitted after the concrete pour sequences, construction joint locations, and placement schedules have been approved by the Architect.
   2. Structural drawings shall not be duplicated for use in the production of shop drawings.
   3. At least 30 days before each scheduled concrete placement, submit shop drawings covering the reinforcing steel details, bar lists, support bars and details, locations of reinforcing bar cut-offs, splices, development lengths and placement details. Prepare shop drawings in accordance with ACI 315 and 315R from reinforcement details shown on the drawings.
   4. Mill Certificates: Accompanying the shop drawings, submit steel producer's certification of mill analysis, tensile, and bend tests for reinforcing steel.
   5. Welder’s certification in conformance with AWS D1.4, when welding is indicated or specified. Testing of welds shall be conducted and witnessed by an independent testing laboratory prior to welding of reinforcement. Maintain qualification and certification records at the job site, readily available for examination of test results.
B. Manufacturer's literature including installation instructions for the following.
   1. Supports

1.06 QUALITY CONTROL
A. Provide in accordance with the requirements of the Quality Control section and as specified.
B. Do not fabricate reinforcement until shop and placement drawings have been approved by the Architect.
C. Tolerances:
   1. Tolerances shall be as specified in ACI 315R.

1.07 DELIVERY, STORAGE, AND HANDLING
A. Delivery: Deliver reinforcement to the job site bundled, tagged, and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on shop drawings.
B. Storage: Store reinforcement at the job site in a manner to prevent damage and accumulation of dirt and excessive rust.

1.08 PRE-INSTALLATION MEETING
A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 - PRODUCTS

2.01 MATERIALS
A. Reinforcing bars shall be newly rolled deformed bars conforming to ASTM A615 Grade 60, unless otherwise indicated on the Drawings.
   1. Where necessary, bars to be welded shall conform to ASTM A706 deformed, Grade 60. As an alternate to welding, provide mechanical splice anchors (or couplers).
   2. Provide mill bent reinforcing bars, bent cold to the dimensions indicated and conforming to the requirements of ACI SP-66.
B. Welded wire fabric shall conform to ASTM A 185, with a minimum ultimate tensile strength of 70,000 psi. Provide in sizes indicated. Provide support bars and reinforcing bar supports as specified to obtain the concrete cover.

C. Bar support and accessories (bolsters or chairs) shall be galvanized or plastic coated and shall conform to ACI 315. Provide minimum size number 5 support bars.

D. Provide 3-in. by 3-in. plain precast concrete blocks and precast concrete doweled blocks for reinforcing bar supports in foundation mats, base slabs, footings, pile caps, grade beams and slabs on grade. Provide block thickness to produce concrete cover of reinforcement as indicated. Provide blocks of Type II cement with 3000 psi minimum compressive strength in conformance with the Section 03300, Cast-in-Place Concrete.

E. Wire for tying reinforcement in place shall be No. 16 AWG or heavier black soft-annealed wire.

2.02 FABRICATION

A. Fabricate reinforcement only after shop drawings have been returned by the Architect and Engineer marked with some form of approval to proceed.

B. Provide reinforcing bars that have been cut and bent before shipment. If bars must be bent on site, bend reinforcing steel cold, and do not straighten or re-bend in a manner which will damage the material. Bend in conformance with requirements of ACI SP-66 or with ASTM A767 when reinforcement is to be galvanized.

C. Splices:
   1. Provide standard reinforcement splices by lapping ends, placing bars in contact, and tightly wire tying for the full length of the splice. All lap splices shall be ACI 318, Class B, unless indicated otherwise on the Drawings.
   2. Adjacent splices shall be staggered whenever possible.

PART 3 - EXECUTION

3.01 GENERAL

A. General: Comply with Concrete Reinforcing Steel Institute’s recommended Practice for “Placing Reinforcing Bars”, for details and methods of reinforcement placement and supports, and as herein specified.

3.02 PLACEMENT

A. Comply with the specified standards for details and methods of reinforcement placement and supports, and as herein specified. Comply with concrete protective cover requirement indicated on the Drawings.

B. Clean reinforcement to remove loose rust and mill scale, earth, and other materials that would reduce or destroy bond with concrete.

C. Position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers to ensure no movement occurs during placing and finishing of concrete.

D. Place reinforcement to obtain the specified coverage for concrete protection. Arrange, space, and securely tie bars and bar supports together with wire, to hold reinforcement accurately in position during concrete placement operation. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.

E. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least two full squares.

F. Provide supports of sufficient numbers and strengths to carry reinforcement. Do not place reinforcing bars more than 2 inches beyond the last leg of any continuous bar support. Do not use supports as bases for runways for conveying equipment and similar construction loads.

G. Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits or embedded items. Bars moved more than three inches are subject to approval of Engineer. Place required number of bars.
H. Position dowels accurately, rigidly support, and securely tie. Align dowels normal to concrete surface before concrete placement. Setting dowels into wet concrete is prohibited.

I. Provide and place safety caps on all exposed ends of vertical reinforcement.

J. Tie a minimum of 25 percent of all intersecting bars in foundation mats, base slabs, footings, pile caps, slabs on grade and elevated slabs.

K. Do not splice reinforcement steel in foundation mats, base slabs, beams, girders, slabs and walls at points of maximum stress unless otherwise indicated.

L. Lab splice welded wire fabric reinforcement at least two full meshes. Stagger splices to avoid continuous laps in either direction and wire tightly together. Straighten rolled welded wire fabric reinforcement into flat sheets before use.

M. Provide continuous reinforcement through construction joints.

3.03 RUBBISH REMOVAL

A. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION
PART 1 - GENERAL

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

1.02 DESCRIPTION OF WORK
   A. The Work of this Section shall include, but not be limited to, furnishing and installation of the following:
      1. Repair CMU wall
      2. Repoint joints
      3. Scrape, clean, and prep wall to receive new paint

1.03 RELATED WORK SPECIFIED ELSEWHERE
   A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.
   B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
      1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
      2. Section 02 41 13 – Selective Demolition
      3. DIVISION 03 – CONCRETE; including all Sections contained therein
      4. Section 04 21 11 – Reinforced Unit Masonry
      5. DIVISION 05 – METALS; including all Sections contained therein.
      6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
      7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
      8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
      9. DIVISION 09 – FINISHES; including all Sections contained therein.
     10. Section 21 00 00 – Fire Suppression
     11. Section 22 00 00 – Plumbing
     12. Section 23 00 00 - HVAC
     13. Section 26 00 00 – Electrical
     14. DIVISION 31 – EARTHWORK; including all Sections contained therein
     15. Section 32 12 00 – Site Improvements

1.04 DEFINITIONS
   A. Low-Pressure Spray: 100 to 400 psi.

1.05 ACTION SUBMITTALS
   A. Product Data: For each type of product indicated.
   B. Samples: For each exposed Product and for each color and texture specified.

1.06 INFORMATIONAL SUBMITTALS
   A. Preconstruction Test Reports.
1.07 QUALITY ASSURANCE

A. Restoration Specialist Qualifications: Engage an experienced CMU wall restoration and cleaning firm to perform work of this Section. Firm shall have completed work in a similar material, design, and extent to that indicated for this Project with a record of successful in-service performance. Experience installing standard unit masonry is not sufficient experience for masonry restoration work.
   1. A Contractor's option, work may be divided between two specialist firms: one for cleaning work and one for repair work.
   2. Field Supervision: Restoration specialist firms shall maintain experienced full-time supervisors on Project site during times that clay masonry restoration and cleaning work is in progress.
   3. Restoration Worker Qualifications: Persons who are experienced in restoration work of types they will be performing.

1.08 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 - PRODUCTS

2.01 MASONRY MATERIALS

A. Provide CMU where required to complete masonry restoration work.
   1. Provide CMU with physical properties, colors, color variations within units, surface texture, size and shape to match existing masonry.

2.02 MORTAR MATERIALS

A. Portland Cement: ASTM C150, Type I or Type II, white or gray or both where required for color matching of exposed mortar.
   1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C 114

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

C. Mortar Sand: ASTM C144 unless otherwise indicated.
   1. Color: Provide natural sane or ground marble, granite, or other sound stone of color necessary to produce required mortar color.
   2. For pointing mortar, provide sand with rounded edges.
   3. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.

D. Mortar Pigments: Natural and synthetic iron oxides compounded for mortar mixes. Use only pigments with record of satisfactory performance in masonry mortars.

E. Water: Potable.

2.03 MANUFACTURED REPAIR MATERIALS

A. Masonry Patching Compound: Factory-mixed cementitious product that is custom manufactured for patching masonry.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Cathedral Stone Products, Inc; Jahn M100 Terra Cotta and CMU Repair Mortar
      b. Conproco Corporation: Mimic
      c. Edison Coatings, Inc: Custom System 45
2. Use formulation that is vapor – and water permeable (equal to or more than the masonry unit), exhibits low shrinkage, has lower modulus of elasticity than the masonry units being repaired, and develops high bond strength to all types of masonry.

3. Formulate patching compound used for patching CMU in colors and textures to match each masonry unit being patched.

2.04 ACCESSORY MATERIALS

A. Setting Buttons: Resilient plastic buttons, non-staining to masonry, sized to suit joint thicknesses and bed depths of masonry units without intruding into required depths of pointing materials.

2.05 MORTAR MIXES

A. Measurement and Mixing Measure cementitious materials and sane in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.

   1. Mixing Pointing Mortar: Thoroughly mix cementitious materials and sane together before adding any water. Then mix again adding only enough water to product a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one hour of final mixing; do not re-temper or use partially hardened material.

B. Colored Mortar: Product mortar of color required by using specified ingredients. Do not alter specified proportions without Architects approval.

   1. Mortar pigments: Where mortar pigments are indicated, do not exceed a pigment-to-cement ratio of 1:10 by weight.

C. Do not use admixtures in mortar unless otherwise indicated.

D. Mortar Proportions: Mix mortar in the following proportions.

   1. Pointing and rebuilding (Setting) Mortar: Comply with ASTM C270, Proportion Specification, Type N unless otherwise indicated; with cementitious material limited to Portland cement and lime.

PART 3 - EXECUTION

3.01 PROTECTION

A. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from masonry restoration work.

3.02 CMU REMOVAL AND REPLACEMENT

A. At locations indicated, remove CMU that are damaged, spalled, or deteriorated or are to be reused for rebuilding. Carefully demolish or remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.

B. Support and protect remaining CMU wall that surrounds removal area. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.

C. Notify Architect of unforeseen detrimental conditions including voids, cracks, bulges, and loose units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.

D. Remove in an undamaged condition as many whole CMU as possible.

   1. Remove mortar, loose particles, and soil from CMU by cleaning with hand chisels, brushes and water.

   2. Remove sealants by cutting close to CMU with utility knife and cleaning solvents.

E. Clean CMU wall surrounding removal areas by removing mortar, dust, and loose particles in preparation for replacement.
F. Replace removed damaged CMU units with other removed units in good quality, where possible, or with new CMU matching existing masonry, including size. Do not use broken units unless they can be cut to usable size.

G. Install replacement CMU into bonding and coursing pattern of existing masonry wall. If cutting is required, use a mortar-driven saw designed to cut masonry with clean, sharp, unchipped edges.
   1. Maintain joint width for replacement units to match existing joints.
   2. Use Setting Buttons or shims to set units accurately spaced with uniform joints.

H. Lay replacement CMU with completely filled bed, head, and collar joints; Butter ends with sufficient mortar to full head joints and shove into place. Wet both replacement and surrounding masonry that have ASTM C67 initial rates of absorption (suction) of more than 30 g/30 sq. in per min. Use wetting methods that ensure that units are nearly saturated but surface is dry when laid.
   1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing masonry work.
   2. Rake out mortar used for laying CMU before mortar sets and point new mortar joints in repaired area to comply with requirements for repointing existing masonry, and at same time as repointing of surrounding area.
   3. When mortar is sufficiently hard to support units, remove shims and other devices interfering with pointing of joints.

3.03 CMU WALL PATCHING

A. Patching CMU Wall:
   1. Remove loose materials from masonry surface. Carefully remove additional material so patch will not have feathered edges but will have square or slightly undercut edges on area to be patched and will be at least ¼ inch thick, but not less than recommended by patching compound manufacturer.
   2. Mask adjacent mortar joint or rake out for repointing if patch will extend to edge of CMU.
   3. Mix patching compound in individual batches to match each unit being patched.
   4. Rinse surface to be patched and leave damp, but without standing water.
   5. Brush-coat surfaces with slurry coat of patching compound according to manufacturer’s written instructions.
   6. Place patching compound in layers as recommended by patching compound manufacturer, but not less than ¼ inch or more than 2 inches thick. Roughen surfaces of each layer to provide a key for next layer.
   7. Trowel, scrape, or carve surface of patch to match texture and surrounding surface plane or contour of the masonry unit. Shape and finish surface before or after curing, as determined by testing, to best match existing masonry unit.
   8. Keep each layer damp for 72 hours or until patching compound has set.

3.04 PRELIMINARY CLEANING

A. Removing Plant Growth: Completely remove visible plant, moss, and shrub growth from masonry surfaces. Carefully remove plants, creepers, and vegetation by cutting at roots and allowing to dry as long as possible before removal. Remove loose soil and debris from open masonry joints whatever depth they occur.

B. Preliminary Cleaning: Before beginning general cleaning, remove extraneous substances that are resistant to cleaning methods being used. Extraneous substances including paint, caulking, asphalt, and tar.
   1. Carefully remove heavy accumulations of material from surface of masonry with a sharp chisel. Do not scratch or chip masonry surface.
   2. Remove paint and caulking with alkaline paint remover.
      a. Comply with requirements in “Paint Removal” article
      b. Repeat application up to two times if needed
   3. Remove asphalt and tar with solvent-type paint remover.
      a. Comply with requirements in “Paint Removal” article
      b. Apply paint remover only to asphalt and tar by brush without pre-wetting
      c. Allow paint remover to remain ion surface for 10 to 30 minutes
3.05 REPOINTING MASONRY WALL

A. Rake our and repoint joints to the following extent:
   1. All joints in areas indicated.
   2. Joints where mortar is missing or where they contain holes.
   3. Cracked joints where cracks can be penetrated at least 1/4 inch by a knife blade 0.027 inch thick.
   4. Cracked joints where cracks are 1/8 inch or more in width and of any depth
   5. Joints where they sound hollow when tapped by metal object
   6. Joints where they are worn back ¼ inch or more from surface
   7. Joints where they are deteriorated to the point that mortar can be easily removed by hand, without tools
   8. Joints where they have been filled with substances other than mortar
   9. Joints indicated as sealant-filled joints

B. Do not rake out and repoint joints where not required.

C. Rake out joints as follows:
   1. Remove mortar from joints to depth of 2-1/2 times joint width but not less than ½ inch or not less than that required to expose sound, un-weathered mortar.
   2. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
   3. Do not spall edges of masonry units or widen joints. Replace or patch damaged masonry units as directed by Architect.
      a. Cut out mortar by hand with chisel and resilient mallet. Do not use power-operated grinders.
      b. Cut out center of mortar bed joints using angle grinders with diamond-impregnated metal blades. Remove remaining mortar by hand with chisel and resilient mallet.

D. Notify Architect of unforeseen detrimental conditions including voids in mortar joints, cracks, loose masonry units, rotted wood, rusted meal, and other deteriorated items.

E. Pointing with Mortar:
   1. Rinse joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen joint surfaces before pointing.
   2. Apply Pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in later not greater than 3/8 inch until a uniform depth is formed. Fully compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
   3. After low areas have been filled to same depth as remaining joints, point all joints by placing mortar in layers not greater than 3/8 inch. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing masonry units have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened faces. Take care not to spread mortar beyond joint edges onto exposed masonry surfaces or to featheredge the mortar.
   4. When mortar is thumbprint hard, tool joints to match original appearance of joints as demonstrated in approved mock-up. Remove excess mortar from edge of joint by brushing.
   5. Cure mortar by maintaining mortar in thoroughly damp condition for at least 72 consecutive hours including weekends and holidays.
      a. Acceptable curing methods include covering with wet burlap and plastic sheathing, periodic hand misting, and periodic mist spraying using systems of pipes, mist, heads and timers.
   6. Hairline cracking within mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

F. Where repointing work precedes cleaning of existing masonry, allow mortar to harden at least 30 days before beginning cleaning work.
3.06 RUBBISH REMOVAL

A. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION
PART 1 - GENERAL

1.01 FILED SUB-BID REQUIREMENTS

A. The Work of this Section is stipulated as a filed Sub-Bid under Paragraph D, Item 2 of the Form for General Bid.

B. All Sub-bids shall be submitted on the Form for Sub-Bid, included as Section 00 00 20 of these Specifications, as required by Section 44F of Chapter 149 of the General Laws, as amended.

C. The attention of Bidders is directed to Section 00 00 20 – City of New Bedford Front End Documents. Instructions to Bidders. Sub-Bids shall be filed with the Awarding Authority in accordance with requirements stipulated therein.

D. The Work of the Filed Sub-Bid for Section 04 20 00 shall include the Work of the following Specification Section in its entirety:

1. Section 04 21 11 - Reinforced Unit Masonry

E. The Trade Contractor for this Section shall examine all Drawings and all Sections of the Specification for requirements therein that may affect the Work of this Section, not just those Drawings and Specifications particular to the Work of this Section. The Work of this Section is shown primarily on the following listed Drawings

1.02 RELATED DOCUMENTS

A. All the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 1- General Requirements, apply to the Work of this Section.

1.03 DESCRIPTION OF WORK

A. The Work of this Section shall include, but not be limited to, furnishing and installation of the following:

1. Standard concrete masonry units
2. Pre-Insulated concrete masonry units
3. Cold weather protection for masonry Work
4. Staging, scaffolding, hoists, and related equipment

B. Items to be Furnished Only: Furnish the following items for installation by the designated Sections:

1. Section 05 12 00 – Structural Steel Framing: Weld-on ties for masonry anchors

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

1. Section 04 21 11 - Reinforced Unit Masonry: Vertical reinforcing bars and mortar and grout mixes
2. Section 05 50 00 - Metal Fabrications: Loose steel angle lintels for all openings in masonry walls, and anchors, blocking, plates, anchor bolts, and ties to be built into masonry
3. Fire Suppression, Plumbing, Mechanical, Electrical Sections: Access panels, sleeves for piping and conduit to be built into the Work of this Section.

1.04 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which effect the Work of this Section.
B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
2. Section 02 41 13 – Selective Demolition
3. DIVISION 03 – CONCRETE; including all Sections contained therein
4. DIVISION 04 - MASONRY; including all Sections contained therein
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
9. DIVISION 09 – FINISHES; including all Sections contained therein.
10. Section 21 00 00 – Fire Suppression
11. Section 22 00 00 – Plumbing
12. Section 23 00 00 - HVAC
13. Section 26 00 00 – Electrical
14. DIVISION 31 – EARTHWORK; including all Sections contained therein
15. Section 32 12 00 – Site Improvements

1.05 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures in accordance with requirements of the Contract Documents.

B. Samples:

1. Four representative samples of the masonry units showing the range of color, texture, dimension and any scoring, similar treatment.
2. 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.
3. Weep holes/vents
4. Accessories embedded in masonry

1.06 QUALITY ASSURANCE

A. Source Limitations for Masonry Units: Obtain concrete masonry units through one source from a single manufacturer for each product required.

B. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

C. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in Division 01 for mockups.

1. Build sample panels for typical exterior and interior walls in sizes approximately 72 inches long by 48 inches high by full thickness.
2. Where masonry is to match existing, erect panels adjacent and parallel to existing surface.
3. Clean one-half of exposed faces of panels with masonry cleaner indicated.
4. Protect approved sample panels from the elements with weather-resistant membrane.
5. Sample panels shall remain in place until removal is authorized by Owner or Architect.
6. Approval of sample panels is for quality, color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; clean down; and other material and construction qualities specifically approved by Architect in writing.
1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver concrete masonry units to the job site on manufacturer’s standard pallets. Deliver ground face, polished and weathered polished units with heat shrink plastic covering and with non-staining protection cushion between faces.

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

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.
   2. Where 1 wythe of multi-wythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover 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.


1.09 WEATHER PROTECTIONS

A. Hot Weather Protection: Use mortar within 1-1/2 hours after mixing. Discard all mortar over 1-1/2 hours old and all mortar that has stiffened due to hydration (setting).

B. Cold Weather Protection: The Masonry Subcontractor shall strictly comply with recommendations of Brick Institute of America Technical Note No. 1a, Cold Weather Masonry Construction, Construction and Protection Recommendations and The Portland Cement Association. When the temperature is below 40°F temporary enclosures and heat shall be provided by the General Contractor and the following procedures shall be followed by the Masonry Subcontractor:
   1. Cold Weather Protection:
      a. Preparation:
         1) Remove ice or snow formed on masonry bed by carefully applying heat until top surface is dry to touch.
         2) Remove frozen or damaged masonry.
         3) Sprinkle with heated water when brick suction exceeds 30 gm/min./30 sq. in.
            a) When units are above 32°F, heat water above 70°F.
            b) When units are below 32°F heat water above 130°F.
         4) Use dry masonry units.
         5) Do not use frozen units.
2. Construction requirements while Work is progressing:
   a. Air temperature 40°F to 32°F:
      1) Heat sand or mixing water to produce mortar temperatures between 40°F and 120°F.
   b. Air temperature 32°F to 25°F:
      1) Heat sand and mixing water to produce mortar temperatures between 40°F and 120°F.
      2) Maintain temperature of mortar on boards above freezing.
   c. Air temperatures 25°F to 20°F:
      1) Heat sand and mixing water to produce mortar temperatures between 40°F and 120°F.
      2) Maintain mortar temperatures on boards above freezing.
      3) Use approved heat sources on both sides of walls under construction by the General Contractor.
      4) Use windbreaks when wind is in excess of 15 mph.
   d. Air temperature 20°F and below:
      1) Heat sand and mixing water to produce mortar temperatures between 40°F and 120°F.
      2) The General Contractor shall provide temporary enclosures and heat as necessary to maintain air temperature above 32°F.
      3) Minimum temperature of units when laid: 20°F.
      4) Produce subsequent mortar batches within +/-10°F of first batch.

3. Protection requirements for completed masonry and masonry not being Worked on:
   a. Mean daily air temperature 40°F to 32°F: Protect masonry from rain or snow for 24 hours by covering with non-staining weather-resistant membrane.
   b. Mean daily air temperature 32°F to 25°F: Completely cover masonry with non-staining weather-resistant membrane for 24 hours.
   c. Mean daily air temperature 25°F to 20°F: Completely cover masonry with insulating blankets or equal protection for 24 hours.
   d. Mean daily air temperature 20°F and below: Maintain masonry temperature above 32°F for 24 hours by enclosure and supplementary heat, electric heating blankets, infrared lamps, or other acceptable methods provided by the General Contractor.

C. Cover Work at the end of each day and whenever Work is not in progress. Extend cover down both sides of walls at least 24 in. and hold securely in place.

D. Load Application:
   1. Do not apply uniform floor loading or roof loading for at least twelve hours after building masonry columns or walls.
   2. Do not apply concentrated loads for at least three days after building masonry columns or walls.

E. Perform Work only when ambient temperature and surface temperature of existing unit masonry and new materials are between 40 deg. F and 80 deg. F. Work only when temperature is forecasted to be 40 deg. F or above for at least one week after completion of Work unless temporary enclosures and heat are provided.

F. Prevent mortar from staining face of masonry and other building components that are to be left exposed. Clean exposed masonry immediately using soft brushes and water only. Protect base of walls from splashed mud and other stains. Protect sills, ledges and projections from mortar droppings.

1.10 CUTTING AND CORING
   A. All new Work that requires cutting and coring of existing floors, walls, and/or roof penetrations measuring 4-1/2 in. or less, shall be performed by the Subcontractor of a Filed Sub-Bid Section.
   B. The General Contractor shall cut and core existing floors, walls, and/or roof penetrations for sizes not indicated by the Filed Sub-Bid sections.
1.11 SCAFFOLDING AND EQUIPMENT
A. Provide, maintain, and remove safe and adequate interior and exterior staging, scaffolding, hoists, and all other related equipment, necessary for proper and complete execution of the Work of this Section in accordance with requirements of the Contract Documents. Staging, scaffolding, hoists, and all other related equipment shall comply with all applicable Federal, State, and local regulations and codes.
B. Staging, scaffolding, hoists, and all other related equipment shall be maintained to complete the Work, and removed when no longer required.

1.12 PRE-INSTALLATION MEETING
A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 - PRODUCTS

2.01 STANDARD CONCRETE MASONRY UNITS
A. Standard Concrete Masonry Units:
1. Acceptable Manufacturers:
   a. A. Jandris & Sons, Inc.
   b. Barnes & Cone
   c. Fizzano Brothers Concrete Products, Inc.
2. Shapes and Sizes: As indicated on the Drawings, selected from manufacturer’s standard and custom shapes and sizes.
4. Integral Insulation at Single Wythe Exterior Walls: Manufacturer’s standard Korfil or Icon inserts.
B. Manufacturing Requirements:
   1. Type: Normal Weight, Medium Weight and Light Weight as required
   2. Hollow and Solid Load-Bearing Units: ASTM C 90
   3. Normal Weight Aggregates: ASTM C 33
   4. Light Weight Aggregates: ASTM C 331
   5. Portland Cements: ASTM C 150
   6. Compressive Strength: ASTM C140, 2000 minimum on the net area

2.02 PRE-INSULATED CONCRETE MASONRY UNITS
A. Concrete Products Group Hi-R CMU
1. Acceptable Manufacturers:
   a. A. Jandris & Sons, Inc.
   b. Barnes & Cone
   c. Fizzano Brothers Concrete Products, Inc.
2. Physical Properties:
   a. Size: 8 in. x 8 in. x 16 in., ASTM C90
   b. Density: 120 lbs./cu. ft.
   c. Thermal Resistance (R): 8.50
   d. Water Vapor Permeance: 1.1 per inch of thickness
   e. Water Absorption % Volume: <1.0
   f. Flame Spread Rating: <5.0
3. Integral Water Repellent For Exterior Units Exposed to the Weather
4. CBIS Hi-R® Masonry Wall System or equal. Insulated units to be reinforced and fully grouted. Factory installed inserts complying with ASTM C 578; Standard Type X. Moisture Absorption: ASTM C 272 – < 1.0% by volume. Thermal Resistance (R) per inch of thickness at 75° = 5.00. Rot & Vermin Resistance: Produced from expanded polystyrene – fully resistant to rot; does not attract vermin, termites or rodents. Insulation shall contain no fluorocarbons and no formaldehyde. Shape: Two-piece interlocking insert shall overlap at both head & bed joints with edges of adjacent inserts of the same type.

2.03 MORTAR, REINFORCING, AND MASONRY ACCESSORIES

A. Mortar and Grout for Concrete Masonry Unit Assemblies:
   1. Mortar Mix: ASTM C 270, Type S, for reinforced masonry, masonry below grade and masonry in contact with earth.
   2. Mortar Mix: ASTM C 270, Type N, for above-grade loadbearing and nonloadbearing walls and parapet walls and for interior loadbearing and nonloadbearing partitions.
   3. Mortar Materials: Portland cement, ASTM C 150, Type I or II.
   5. Mortar Materials: Ready mixed, ASTM C 207, Type S.
   10. Hydrated Lime: ASTM C 207, Type S.
   13. Color: Colored pigmented mortar where exposed at building exterior and natural color elsewhere.

B. Reinforcing:
   1. Reinforcing Steel Bars: ASTM A 615, Grade 60.
   2. Horizontal Reinforcing:
      a. Steel Wire: 9 gauge (.1875 inch) galvanized steel.
      b. Type: Ladder or truss type.
   3. Ties and Anchors: Galvanized steel.
   4. Adjustable Masonry Veneer Anchors: Screw-attached two-piece galvanized triangular or rectangular wire tie and metal anchor.

C. Masonry Accessories:
   1. Cavity drainage material and weeps
   2. Preformed control joint gaskets
   3. Closed cell neoprene sponge

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

PART 3 - EXECUTION

3.01 EXAMINATION

A. 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.
   2. Verify that foundations are within tolerances specified.
B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Comply with NCMA Recommended Practices for Laying Concrete Block and TEK Bulletins and with the following requirements.

B. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

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

D. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

E. 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.
   1. Allow units to dry before laying unless wetting of units is specified. Units cut with a wet saw on site do not require additional drying.
   2. Install cut units with cut surfaces and, where possible, cut edges concealed. Do not use units cut to less than one-half size.

F. Do not install concrete masonry units with more than 5 percent damage to the face.

G. 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.

H. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

I. 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, door jambs, reveals, 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 in. 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 in. 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 in. 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 in. 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 bond pattern indicated on Drawings; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs. Prior to installation review bond pattern with Architect.
C. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar and remove loose masonry units and mortar.

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.

G. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above, unless otherwise indicated.
   1. Install compressible filler in joint between top of partition and underside of structure above.
   2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c., unless otherwise indicated.
   3. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.

3.04 MASONRY JOINT REINFORCEMENT

A. Install Joint reinforcement in accordance with NCMA TEK 12-2, Joint Reinforcement for Concrete Masonry.

B. 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.

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

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

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

3.05 CONTROL JOINTS

A. Install control joints in accordance with NCMA TEK 10-2, Control Joints for Concrete Masonry Walls, NCMA TEK 10-3, Control Joints For Concrete Masonry Walls - Alternative Engineered Method, and NCMA TEK 10-4, Crack Control For Concrete Brick and other Concrete Masonry Veneers.

B. General: Install control joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

C. Form control joints in concrete masonry using one of the following methods:
   1. Fit bond-breaker strips into hollow contour in ends of concrete masonry units on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
   2. Install preformed control-joint gaskets designed to fit standard sash block.
   3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.
   4. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.

3.06 FLASHING

A. Install Flashing in accordance with NCMA TEK 19-04, Flashing Strategies for Concrete Masonry Walls, and NCMA TEK 19-05, Flashing Details for Concrete Masonry Walls.
B. Install flashing as follows, unless otherwise indicated:
   1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where
      flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before
      covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing
      manufacturer.

3.07 CLEANING
A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears
   before tooling joints.
B. Final Cleaning: After mortar and sealants are thoroughly set and cured, clean exposed masonry as follows:
   1. Comply with recommendations of masonry and cleaning product manufacturers.
   2. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
   3. Test cleaning methods on sample wall panel; leave one-half of panel uncleansed for comparison purposes. Obtain
      Architect's approval of sample cleaning before proceeding with cleaning of masonry.
   4. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid
      strippable masking agent or polyethylene film and waterproof masking tape.
   5. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly
      with clear water.
   6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A, Removal of Stains form Concrete
      Masonry, applicable to type of stain on exposed surfaces, and NCMA TEK 8-04: Cleaning Concrete Masonry.

3.08 RUBBISH REMOVAL
A. The Subcontractor of a Filed Sub-Bid Section shall stock pile and drop all waste and debris daily to the floor.
B. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements
   of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION
PART 1 - GENERAL

1.01 FILED SUB-BID REQUIREMENTS
A. The Work of this Section shall be included as part of the Filed Sub-Bid for Section 04 20 00 – Unit Masonry, stipulated as a Filed Sub-Bid under Paragraph D, Item 2 of the Form for General Bid.
B. All Sub-bids shall be submitted on the Form for Sub-Bid, included as Section 00 00 20 of these Specifications, as required by Section 44F of Chapter 149 of the General Laws, as amended.
C. The attention of Bidders is directed to Section 00 00 20 – City of New Bedford Front End Documents. Instructions to Bidders. Sub-Bids shall be filed with the Awarding Authority in accordance with requirements stipulated therein.
D. The Trade Contractor for this Section shall examine all Drawings and all Sections of the Specification for requirements therein that may affect the Work of this Section, not just those Drawings and Specifications particular to the Work of this Section. The Work of this Section is shown primarily on the following listed Drawings

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

1.03 DESCRIPTION OF WORK
A. Items to be Furnished Only: Furnish the following items for installation by the designated Sections:
   1. Section 04 20 00 – Unit Masonry: Vertical reinforcing bars, mortar, and grout mixes
B. Extent of each type of reinforced unit masonry Work shall be as defined in the most recent edition of the International Building Code, IBC, including most recent amendments thereto, or as otherwise indicated on the Drawings.

1.04 RELATED WORK SPECIFIED ELSEWHERE
A. Carefully examine all of the Contract Documents for requirements which affect the Work of this Section.
B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
   2. Section 02 41 13 – Selective Demolition
   3. DIVISION 03 – CONCRETE; including all Sections contained therein
   4. DIVISION 04 – MASONRY; including all Sections contained therein
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
   7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
   8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
   9. DIVISION 09 – FINISHES; including all Sections contained therein.
   10. Section 21 00 00 – Fire Suppression
   11. Section 22 00 00 – Plumbing
   12. Section 23 00 00 - HVAC
   13. Section 26 00 00 – Electrical
   14. DIVISION 31 – EARTHWORK; including all Sections contained therein
   15. Section 32 12 00 – Site Improvements

Reinforced Unit Masonry
04 21 11 - 1
1.05 QUALITY ASSURANCE
   A. Allowable tolerances shall be in accordance with requirements of Section 04 20 00 – Unit Masonry.
   B. Reinforced concrete masonry construction shall conform to all requirements of "Specification for Masonry Construction (ACI - ASCE 530.1)" published by the American Concrete Institute, except as modified by the supplemental requirements contained herein.
   C. All Work shall conform to requirements of the most recent edition of the International Building Code, IBC, including most recent amendments thereto, and applicable referenced standards therein.

1.06 SUBMITTALS
   A. Submit shop drawings for fabrication, bending, and placement of reinforcement bars. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures". Show bar schedules, diagrams of bent bars, stirrup spacing, lateral ties and other arrangements and assemblies necessary for fabrication and placement of reinforcement for unit masonry Work. Shop drawings shall include wall elevations of the buildings indicating rebar placement locations and sizes.
   B. Submit manufacturer's specifications for each type of masonry unit, accessory, and other manufactured product, including certifications that each type complies with specified requirements. Include instructions for handling, storage, installation and protection.
   C. Submit samples of load bearing blocks, ties, reinforcing, and other items as may be required by Architect.

1.07 JOB CONDITIONS
   A. The Work of this Section shall be provided in accordance with requirements of Section 04 20 00 – Unit Masonry.

1.08 TESTING
   A. Field inspection and testing of Work performed under this Section shall be in accordance with testing requirements of International Building Code, most recent Edition, as amended, for Special Inspections and the Owner’s Statement of Special Inspections. The Owner's testing agency shall be present when the Work of this Section is being constructed, and assisted while conducting their Work. Coordinate with the Owner’s designated representative and the testing agency to verify requirements for testing of Work performed under this Section.

1.09 CUTTING AND CORING
   A. All new Work that requires cutting and coring of existing floors, walls, and/or roof penetrations measuring 4-1/2 in. or less, shall be performed by the Subcontractor of a Filed Sub-Bid Section.
   B. The General Contractor shall cut and core existing floors, walls, and/or roof penetrations for sizes not indicated by the Filed Sub-Bid sections.

1.10 SCAFFOLDING AND EQUIPMENT
   A. Provide, maintain, and remove safe and adequate interior and exterior staging, scaffolding, hoists, and all other related equipment, necessary for proper and complete execution of the Work of this Section in accordance with requirements of the Contract Documents. Staging, scaffolding, hoists, and all other related equipment shall comply with all applicable Federal, State, and local regulations and codes.
   B. Staging, scaffolding, hoists, and all other related equipment shall be maintained to complete the Work, and removed when no longer required.

1.11 PRE-INSTALLATION MEETING
   A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.
PART 2 - PRODUCTS

2.01 MATERIALS
   A. Refer to Section 04 20 00 - Unit Masonry for hollow load bearing concrete masonry units and other masonry materials and accessories not included in this Section.
   B. Hollow Load Bearing CMU: ASTM C90 grade N, normal weight, two cell units. F’m = 2500 psi.
   C. Reinforcement Bars: Provide deformed bars of following grades complying with ASTM A 615, except as otherwise indicated.
      1. Provide Grade 40 for bars, except as otherwise indicated
      2. Provide Grade 60 for bars No. 4 to No. 18, except as otherwise indicated
      3. Shop-fabricate reinforcing bars which are shown to be bent or hooked
   D. Ties and Horizontal reinforcement: Refer to Section 04 20 00 – Unit Masonry.

2.02 MORTAR AND GROUT MATERIALS
   A. Portland Cement: ASTM C 150, Type I, except as otherwise approved by Architect. Provide natural color or white cement to produce required mortar color.
   B. Lime: ASTM C 207, special finishing hydrated lime, non-air-entrained.
   C. Aggregate for Mortar: Sand, ASTM C 144 or ASTM C 404, Size No. 2, except for joints. 1/4 inch and less (if any) use aggregate graded with 100 percent passing the No. 16 sieve.
   D. Fine Aggregate for Grout: Sand, ASTM C 33 or ASTM C 404, Size No. 1.
   E. Coarse Aggregate for Grout: ASTM C 404, Size No. 8 or Size No. 89.

2.03 MORTAR AND GROUT MIXES
   A. Measurement: Use methods which shall ensure that specified proportions are controlled and accurately maintained. Measure aggregate materials in a damp, loose condition.
   B. Mortar: ASTM C 270, and the following:
      1. Use Type PL mortar proportioned by volume; one part Portland cement, 1/4 to 1/2 part lime, and sand equal to 2-1/4 to 3 times the sum of the volume of cement and lime materials. (Type S, with a 28 day compressive strength of 2000 psi.)
   C. Grout: ASTM C 476, and the following:
      1. Fine Grout: Proportion by volume; one part Portland cement, zero to one-tenth part lime and sand equal to 2-1/4 to 3 times the sum of the volumes of cement and lime materials. 2500 psi minimum strength. Verify 28 day compressive strength by testing.
      2. Coarse Grout: Proportion by volume; one part Portland cement, zero to one-tenth part lime, and fine aggregate (sand) equal to 2-1/4 to 3 times the sum of the volumes of cement and lime materials, and 3/8 in. (pea stone) aggregate equal to one to two times the sum of the volumes of cement and lime materials. 2500 psi minimum strength. Verify 28 day compressive strength by testing.
   D. Mixing: Combine and mix cement, lime, water and aggregates for a minimum of five minutes in a mechanical batch mixer. For mortar, add as much water as is required for Workability. Mortar may be retempered only once by adding water and remixing to maintain acceptable workability. Do not use mortar or grout which has begun to set or if more than 2-1/2 hours have elapsed after initial mixing.
      1. Mix grout to have a slump of ten inches plus or minus one inch, at time of placement.
   E. Do not add air-entraining agents or other admixtures to mortar or grout materials.
2.04 TESTING AND MASONRY STRENGTH

A. The Masonry Subcontractor shall determine the ultimate net compressive strength of masonry (f’m) by either unit tests or prism tests and submit test results to the Architect prior to first use in the structure. See general notes for requirements.

B. The cost of additional testing and inspection required because of changes in materials or proportions requested by the Masonry Subcontractor shall be paid by the Masonry Subcontractor.

PART 3 - EXECUTION

3.01 PLACING REINFORCEMENT

A. Clean reinforcement of loose rust, mill scale, earth, ice or other materials which shall reduce bond to mortar or grout. Do not use reinforcement bars with kinks or bends not shown on drawings or final shop drawings, or bars with reduced cross-Section due to excessive rusting or other causes.

B. Position reinforcement accurately at the spacing shown. Support and secure vertical bars against displacement. Place horizontal reinforcement as the masonry Work progresses. Where vertical bars are shown in close proximity, provide a clear distance between bars of not less than the nominal bar diameter or 1 in. (whichever is greater).

1. For columns, piers and pilasters, provide clear distance between vertical bars as indicated, but not less than 1-1/2 times the nominal bar diameters or 1-1/2 in., whichever is greater. Provide lateral ties as indicated.

C. Splice reinforcement bars where shown; do not splice at other points unless acceptable to the Architect. Provide lapped splices, unless otherwise shown. In splicing vertical bars or attaching to dowels, lap ends, place in contact and wire tie.

1. Provide not less than minimum lap shown, or if not shown, use 48 bar diameters.

D. For multiple wythe walls, embed prefabricated horizontal joint reinforcing as the Work progresses, with a minimum cover of 5/8 in. on exterior face of walls and 1/2 in. at other locations. Lap units not less than 6 in. at ends. Use prefabricated "L" and "T" units to provide continuity at corners and intersections. Cut and bend units as recommended by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.

E. Anchor reinforced masonry Work to supporting structure as indicated on drawings.

F. Vertical Reinforcing: Place one bar per cell (size as noted on the structural drawings) at spacing noted on the structural drawings, plus at corners and each side of openings as minimum reinforcement unless shown otherwise.

G. CMU Bond Beams: Provide minimum two No. 5 bars horizontally at top and bottom or directed by Structural Engineer.

H. Horizontal joint reinforcing for 6 in. thick and smaller CMU shall be welded ladder type, No. 9 gauge diameter and No. 9 gauge cross wire. Ties and joint reinforcing shall be hot-dipped galvanized, in accordance with ASTM A 153.

I. Horizontal joint reinforcing for 8 in. thick and wider CMU shall be welded tri-rod truss type, No. 9 gauge side pods and No.9 gauge cross wire. Ties and joint reinforcing shall be hot-dipped galvanized, in accordance with ASTM A 153.

J. Horizontal joint reinforcing shall be provided for all CMU walls spaced not more than 16 in. O.C. vertically, except space reinforcing at 8 in. O.C. immediately above and below openings and extend this reinforcing at least 2 ft. beyond each jamb. Overlap joints in reinforcing at least 8 in. Do not bridge expansion and control joints, if any. Provide preformed corners and tees.

3.02 INSTALLATION - GENERAL

A. Refer to Section 04 20 00 - Unit Masonry for general installation requirements of unit masonry and mortar bedding and jointing requirements, except where specifically modified by this Section.
3.03 INSTALLATION OF REINFORCED CONCRETE UNIT MASONRY

A. General:
1. Do not wet concrete masonry units.

B. Lay CMU units with full-face shell and full-web mortar beds. Fill vertical head joints (end joints between units) solidly with mortar from face of unit to a distance behind face equal to not less than the thickness of longitudinal face shells. Maintain head and bed joints widths shown, or if not shown, provide 3/8 in. joints.

C. Maintain vertical continuity of core or cell cavities, which are to be reinforced and grouted, to provide minimum clear dimensions indicated and to provide minimum clearance and grout coverage for vertical reinforcement bars. Keep cavities free of mortar. Solidly bed webs in mortar where adjacent to reinforced cores or cells.

D. Where horizontal reinforced beams (bond beams) are shown, use special units to allow for placement of continuous horizontal reinforcement bars. Place small mesh expanded metal lath or wire screening in mortar joints under bond beam courses over cores or cells of non-reinforced vertical cells, or provide units with solid bottoms. The use of other materials must be approved by the Architect prior to use.

E. Grouting:
1. Use "Fine Grout" for filling 4 in. spaces or smaller in both horizontal directions.
2. Use "Course Grout" for filling 4 in. spaces or larger in both horizontal directions.
3. Grouting Technique: Use Low-Lift grouting techniques only.

F. Grout shall be placed in masonry at a minimum temperature of 70 degrees F and a maximum temperature of 120 degrees F. The grouted masonry shall be maintained above 32 degrees F for 24 hours following placement of grout.

G. Place and tie vertical reinforcement prior to laying of CMU. Extend above elevation of maximum pour height to allow for proper splicing. Support in position at vertical intervals not exceeding 24 in. with rebar spacers.

H. Lay CMU to maximum pour height. Do not exceed 4 ft. height, or if bond beam occurs below 4 ft. height stop pour at course below bond beam.

I. Pour grout using container with spout or by chute. Rod or vibrate grout during placing. Place grout continuously; do not interrupt pouring of grout for more than one hour. Terminate grout pour 1-1/2 in. below top course of pour.

J. Bond Beams: Stop grout in vertical cells 1-1/2 in. below bond beam course. Place horizontal reinforcement in bond beams; lap at corners and intersections as shown. Place grout in bond beam course before filling vertical cores above bond beam.

K. Provide cleanout holes in first course at all vertical cells which are to be filled with grout.
1. Use units with one face shell removed and provide temporary supports for units above, or use header units with concrete brick supports, or cut openings in one face shell.

L. Construct masonry to full height of maximum grout pour specified, prior to placing grout.
1. Limit grout lifts to heights recommended by the National Concrete Masonry Association, NCMA, for the type of units, reinforcing and grout used in the Work, but in no case exceed 160 bar diameter.
2. Place vertical reinforcement before grouting. Place before or after laying masonry units, as influenced or controlled by job conditions. Tie vertical reinforcement to dowels at base of masonry where shown and thread CMU over or around reinforcement. Support vertical reinforcement at intervals not exceeding 160 bar diameters.
3. Where individual bars are placed after laying masonry, place wire loops extending into cells as masonry is laid and loosen before mortar sets. After insertion of reinforcement bar, pull loops and bar to proper position and tie free ends.
4. Place horizontal beam reinforcement as the masonry units are laid.

M. Prior to grouting, inspect and clean grout spaces. Remove dust, dirt, mortar droppings, loose pieces of masonry and other foreign materials from grout spaces. Clean reinforcement and adjust to proper position. Clean top surface of structural members supporting masonry to ensure bond. After final cleaning and inspection, close cleanout holes and brace closures to resist grout pressures.
N. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist displacement of masonry units and breaking of mortar bond. Install shores and bracing, if required, before starting grouting operations.

O. Place grout by pumping into grout spaces unless alternate methods are acceptable to the Architect.
   1. Limit grout pours to Sections which can be completed in one Working day with not more than one hour interruption of pouring operation. Place grout in lifts which do not exceed 4’. Allow not less than 30 minutes, nor more than one hour between lifts of a given pour. Rod or vibrate each grout lift during pouring operation.
   2. Place grout in lintels or beams over openings in one continuous pour.

P. Where bond beam occurs more than one course below top of pour, fill bond beam course to within 1 in. of vertically reinforced cavities, during construction of masonry.

Q. When more than one pour is required to complete a given Section of masonry, extend reinforcement beyond masonry as necessary for proper splicing. Pour grout to within 1-1/2 in. of top course of first pour. After grouted masonry is cured, lay masonry units and place reinforcement for second pour Section before grouting. Repeat sequence if more pours are required.

3.04 INSPECTION
   A. Field inspection and testing of Work performed under this Section shall be in accordance with testing requirements of International Building Code, most recent Edition, as amended, for Special Inspections and the Owner’s Statement of Special Inspections. The Owner’s testing agency shall be present when the Work of this Section is being constructed, and assisted while conducting their Work. Coordinate with the Owner’s designated representative and the testing agency to verify requirements for testing of Work performed under this Section.

3.05 RUBBISH REMOVAL
   A. The Subcontractor of a Filed Sub-Bid Section shall stock pile and drop all waste and debris daily to the floor.
   B. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.
SECTION 05 12 00
STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

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

1.02 DESCRIPTION OF WORK
A. The Work of this Section shall include, but not be limited to, furnishing and installation of the following:
   1. Anchor bolts and loose leveling plates.
   2. Base plates, columns, tubes, channels, struts, beams, hangers, girders, bracing (temporary and permanent), brackets, pipe links, anchors, shear heads, angles, stiffeners, plates, bolsters, clips, support angles for steel deck, lintels or relieving angles affixed to structural steel, concrete slabs, spandrels or masonry block and corresponding connections (bolted and welded).
   3. Openings (unreinforced and reinforced) in structural steel required to accommodate mechanical, plumbing, and electrical Work.
   4. Shop paint, including finish coat(s) when required, and field touch-up paint for designated structural steel items.
   5. Hot-dip galvanizing for designated steel items such as relieving angles and other items exposed to the weather.
   6. Design and shop drawings of bolted/welded structural connections.
   7. Shop-installation of headed shear connectors (excluding shear connectors fastened through steel deck) where shown on the drawings.
   9. Structural steel items required to be built into or form part of Work specified under other Sections, to appropriate trade at proper time with complete instructions and templates to facilitate installation. Verify proper installation of same.
   11. Unless specifically excluded, furnishing and installation of any other items of structural steel Work indicated on Drawings, specified or obviously needed to make Work of this Section complete.
   12. Chemical or adhesive capsule anchors or expansion anchors.
B. Items to be Installed Only: Install the following items as furnished by the designated Sections:
   1. Section 04 20 00 – Unit Masonry: Weld-on ties for masonry anchors

1.03 RELATED WORK SPECIFIED ELSEWHERE
A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.
B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following Divisions:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
   2. Section 02 41 13 – Selective Demolition
   3. DIVISION 03 – CONCRETE; including all Sections contained therein
   4. DIVISION 04 – MASONRY; including all Sections contained therein
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
   7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
9. DIVISION 09 – FINISHES; including all Sections contained therein.
10. Section 21 00 00 – Fire Suppression
11. Section 22 00 00 – Plumbing
12. Section 23 00 00 - HVAC
13. Section 26 00 00 – Electrical
14. DIVISION 31 – EARTHWORK; including all Sections contained therein
15. Section 32 12 00 – Site Improvements

1.04 QUALITY ASSURANCE

A. Except as otherwise specified herein, perform Work in accordance with specifications noted below, including Latest Editions of applicable specifications, codes, and standards cited therein, and latest applicable addenda and supplements. Copies of these items shall be kept available in shop and field.


B. Any material or operation specified by reference to published specifications of manufacturer or published standard shall comply with said specification or standard. In case of conflict between referenced specifications, or referenced specifications and Project Specifications, the more stringent requirement shall govern.

1.05 SUBSTITUTIONS AND UNIT PRICES

A. Substitutions for member sizes, type(s) of steel, connection details or any other modifications proposed by the Contractor will be considered by the Architect in accordance with requirements of Section 01 33 00 – Submittals, and Section 01 60 00 – Product Requirements, and only under the following conditions:

1. The request has been made and accepted prior to submission of Shop Drawings.
2. There is a substantial cost advantage or time advantage to Owner; or that the proposed revision is necessary to obtain required materials or methods at proper times to accomplish Work in time scheduled.
3. Sufficient sketches, engineering calculations, and other data have been submitted to facilitate checking by Engineer, including cost reductions or savings in time to complete Work.
4. As may be determined necessary in the field in cooperation with the Architect and Engineer during performance of the Work of this Section, the Contractor shall provide and submit engineering calculations, design sketches, and detailing of beam and/or column size changes and additional moment connections as required to comply with requirements of the Contract Documents.

1.06 SUBMITTALS

A. Submit “job standard” connection details proposed prior to submitting detailed Shop Drawings.
B. Submit joint welding procedures and program of welding sequence (for each component and for welding components together) before any welding is done. After return of submittal, welding procedures and sequences shall be followed without deviation. Architect may require requalification of these welding procedures by tests prescribed in AWS “Standard Qualification Procedure”.

C. Submit prior to start of fabrication, non-destructive testing method to be used for specific typical joints. Results of such tests during the course of Work shall, upon request by Architect, be made available for review by Architect and/or Testing Agency.

D. Submit detailed Shop Drawings, including erection drawings, schedules and index sheets showing: grades of steel; identification mark of members; dimensions; size, arrangement, and weight of members; orientation and relation of members to appropriate grid lines; setting elevations for column bases; framing to support metal deck; location and size of openings, slots, and holes; requirements, such as punched or drilled holes, for attachment of other materials or parts of construction; type, size, and location of shop and field connections; type, size, and extent of welds; joint welding procedures; welding sequences (use welding symbols adopted by American Welding Society); cleaning requirements prior to painting; type and dry thickness of paint. Members to be galvanized shall be so noted on shop drawings.

1. Submit sepias and prints to the Architect for review and distribution. All sepias must be reviewed and stamped by the Architect, Engineer, and Contractor and a record copy submitted to each party. Drawings submitted to Architect without Contractor’s stamp of compliance will not relieve the Contractor from errors or omission resulting from the review. These drawings will be rejected without review. General Contractor is responsible for all affect operations.

2. The Engineer shall review shop drawings for conformance to structural requirements only. The Architect shall review shop drawings for Architectural requirements. Except as otherwise noted, approval of Shop Drawings will be for size and arrangement of components. Errors in dimensions shown on Shop Drawings shall be responsibility of Contractor. Check and coordinate structural steel Work with Work of other trades before submitting Shop Drawings.

3. Do not proceed with fabrication of material or performance of Work until corresponding item on Shop Drawing has been approved by Architect or Engineer as applicable.

4. Contract Documents shall not be used as shop drawings.

E. Submit complete design calculations, properly coordinated with Shop Drawings. Connection calculations shall be certified by a structural engineer registered in Massachusetts.

F. Submit drawings showing details of proposed corrective Work prior to performing corrective Work.

G. Maintain records of shop and field welding procedures and records of welders employed, date of qualification and identification symbol or mark. Maintain records for each impact wrench used in shop and field, showing dates, sizes of bolts tested and the corresponding torque values. Certified copies of the records shall be made available to Contractor, Architect and Testing laboratory.

H. Provide setting drawings, templates, and directions for the installation of anchor bolts, or other items to be installed by others. Verify proper installation of same.

I. Items requiring field measuring shall have all dimensions verified in the field before fabrication. Field dimensions shall be shown on the Shop Drawings and shall be noted as having been verified in the field.

1.07 PRODUCT HANDLING

A. Structural material, either plain or fabricated, shall be stored above the ground, on platforms, skids, or other supports. Material shall be kept free from dirt, grease, and other foreign matter, and shall be protected from corrosion.

1.08 PROTECTION

A. The Subcontractor shall exercise all reasonable precautions to protect the finished concrete floor surfaces and adjacent Work from damage. Green concrete floors shall not be overloaded.
1.09 TESTING
   A. Field inspection and testing of Work performed under this Section shall be in accordance with testing requirements of 780 CMR, Chapter 17 - Special Inspections and the Owner’s Statement of Special Inspections. The Owner’s testing agency shall be present when the Work of this Section is being constructed, and assisted while conducting their Work. Coordinate with the Owner’s designated representative and the testing agency to verify requirements for testing of Work performed under this Section.

1.10 PRE-INSTALLATION MEETING
   A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 – PRODUCTS

2.01 MATERIALS
   A. All material shall be new and un-spliced.
   C. Channels, Angles, Plates, Bars and Rods: ASTM A36, except where another type of steel is indicated. Plates shall be ASTM A572 grade 50 U.O.N.
   D. Cold Formed Steel Tubing: ASTM A500, Grade C, Fy = 50 ksi.
   E. Electric Resistance Welded Steel Piping: ASTM A53, Type E, Grade B.
   F. Anchor Rods: ASTM F1554, Grade 36, unless noted otherwise.
   G. High-Strength Threaded Fasteners with Nuts and Washers:
      1. ASTM A325 with a geometry complying with Heavy Hex Structural Bolts, ANSI Standard B18.2.1.
      2. ASTM A490 with a geometry complying with Heavy Hex Structural Bolts, ANSI Standard B18.2.1.
   H. Nuts for Anchor Rods and Fasteners; ASTM A563, Grade C, plain finish with a geometry complying with Heavy Hex Nuts, ANSI Standard B18.2.2. Use double nuts or lock nuts at hanger connections.
   I. Washers for Anchor Bolts and Fasteners; Flat circular hardened washers, square or rectangular hardened beveled washers and square or rectangular flat plate washers as follows:
      1. Hardened Steel Washers; ASTM F436. Used where standard or short slotted holes are in the outer plies of the connections.
      2. Plate Washers; ASTM A36. Minimum 3/8" thick with standard holes used at hangers and where oversized or long slotted holes are in the outer plies of the connections. Size plate washers to be 1 inch minimum larger than holes.
   J. Alternate Fasteners: Alternate design fasteners and/or load indicating devices may be used in the field Work only provided that the alternate design fasteners and/or load indicating devices are in accordance with AISC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts" with "Commentary".
   K. Expansion Bolts, Epoxy Bolts and Sleeve Anchors: Shall be installed per the manufacturer’s recommendations.
   * The Contractor shall submit connector devices for review of the Architect. Alternative devices shall satisfy all applicable spacing and edge conditions and shall provide a connection of at least the strength of the connection required on the Contract Documents. Submission for alternative designs should be accompanied by complete engineering calculations certified by a Professional Engineer registered in Massachusetts. Do not use epoxy anchors in direct tension (only).
   L. Electrodes for Shop and Field Welding: Comply with AWS D1.1 and D1.4 - Structural Welding codes and as follows:
      1. Minimum yield strength of electrodes, 70 ksi. Use higher yield strength where required by design or by AWS D1.1 and D1.4 Structural Welding Codes.
2. Electrodes for field welded beam/column moment connections shall have a minimum Charpy V-Notch value of 20 foot-pounds absorbed energy at 40 Degrees F. for buildings which are fully enclosed and heated during the welding process and in service, and 20 foot-pounds absorbed energy at Zero (0-) Degrees F. for all other welding and service conditions.

M. Reinforcing Bar: ASTM A615, Grade 60, Deformed.

N. Headed Shear Studs: ASTM A108, Type B, Grades 1015 to 1020 with arc shields and fluxed ends.

O. Shop Primer:
   1. For non-galvanized structural steel; TNEMEC Series 10-1009 Gray Primer or approved equivalent. Primer to be compatible with finish product.
   2. For galvanized structural steel scheduled to receive finish painting; TNEMEC Series 27 or approved equivalent.
   3. No primer at steel to receive spray fireproofing.
   4. For structural steel elements to receive intumescent paint, provide a shop primer compatible with the intumescent coating.

P. Primer Touch-Up Paint: Identical to shop primer.

Q. Galvanize Touch-Up Paint: TNEMEC 90-97 Tneme-Zinc or approved equivalent.

R. Base metal for rolled shapes or plates exceeding 1 1/2 in. thickness and subjected to through-thickness weld shrinkage strains (i.e. "T" joints and corner joints) shall be supplied with Charpy V-Notch testing in accordance with ASTM A6, Supplementary Requirement S5. The impact test shall meet a minimum average value of 20 foot-pounds absorbed energy at 70 Degrees F. and shall be conducted in accordance with ASTM A673 with the following exceptions:
   1. The center longitudinal axis of the specimens shall be located as near as practical to midway between the inner flange surface and the center of the flange thickness at the intersection with the web mid-thickness.
   2. Tests shall be conducted and paid for by the producer on material selected from a location representing the top of each ingot or part of an ingot used to produce the product represented by these tests.

S. Provide 16% total recycled content of Basic Oxygen Furnace (BOF) produced steel or 67% total recycled content of Electric Arc Furnace (EAF) produced steel.

2.02 FABRICATION

A. Structural material shall be fabricated and assembled in the shop to the greatest extent possible. Shearing and chipping shall be done carefully and accurately. Sole plates of beams and girders shall have full contact with the flanges. Stiffeners shall be fitted neatly between the flanges of girders, and, where tight fits are required to transmit bearing, the ends of stiffeners shall be milled or ground to secure an even bearing against the flange angles, or shall be grooved and fully butt-welded to the flange. Splice plates and fillers under stiffeners shall fit within 1/8 inch of the flange angles. Fillers under end angles shall not project beyond the backs of the angles. The clearance between the ends of spliced web plates shall not exceed 1/4 inch. Assembled pieces shall be taken apart, if necessary, for the removal of burrs and shavings produced by the reaming operation. Parts not completely assembled in the shop shall be secured by bolts, insofar as practicable, to prevent damage in shipment and handling.

   a. End connections for beams and girders shall be "simple shear connections" (AISC Type 2) bearing type.
   b. Bracing, moment, and hanger connections shall be slip-critical Class "A" minimum.
   c. No single angle connections are permitted.
   d. End and single plate shear connections are permitted for in-fill beams with end reactions less than or equal to 10 kips.
e. Stiffened seat connections into column webs are permitted only when approved in advance of the shop drawing preparation by the Structural Engineer of Record. The fabricator shall assume that this type of connection will not be permitted when formulating their bid.

f. Where design forces are not shown on the Structural Contract Drawings:
   2) Bracing and hanger connections shall be designed for the capacity of the member indicated on the Contract Drawing. Bracing and hanger connections are not allowed the 1/3 increase in allowable stress for wind or seismic loading.

2. At eccentric connections where an unbalanced moment is created within the beams, girders and/or columns, the fabricator shall account for the unbalanced moment in the connection design. The fabricator shall note that this requirement shall preclude the use in many instances of horizontal slots in bearing-type connections; seat connections, and other similar types of connections where end rotation cannot be restrained.

3. The minimum number of vertical rows of bolts shall be as follows:
   a. W 8, W10 – 2
   b. W12, W14 – 3
   c. W16, W18 – 4
   d. W21, W24 – 5
   e. W27, W30 - 6

4. Holes shall be provided in members to permit erection and connection of the Work of other trades who will furnish necessary templates and information as may be required. Holes shall not be made or enlarged by burning. Holes for bolts shall be punched or drilled.

5. Welding shall be by certified welders in accordance with AWS Code D1.

6. Column bases shall conform to AISC Specifications unless otherwise indicated. Bottom of columns shall be accurately sawed or otherwise finished to a true plane normal to the vertical axis.

7. The Subcontractor shall be responsible for all errors of detailing fabrication, and for the correct fitting of the structural members.

8. Allowance shall be made for draw in all tension bracing as indicated on shop drawings.

9. For steel elements where paint is required, surfaces shall be prepared for shop painting in accordance with SSPC SP-3. Steel elements to receive intumescent paint shall be prepared in accordance with SSPC SP-6.

---

PART 3 - EXECUTION

3.01 ERECTION

A. Each piece shall be marked with an identification mark corresponding to the mark shown on the field erection drawings.

B. Erection shall conform to the latest AISC Specifications and Standards.

C. All necessary guys, braces, or false Work for the temporary support of any part of the Work shall be provided and the same shall be removed as soon as the Work is erected to a point where the framing is self-supporting, but not before the Work is inspected and approved.

D. Bearing plates and column bases shall be shimmed to line and grade, ready to receive grouting. Shims shall consist of steel wedges of sufficient size to properly support the members. Grout holes shall be provided in plates where necessary.

E. Driftpins may be used only to bring several parts together; they shall not be used to enlarge holes or in a manner to distort or damage the metal.

F. All structural steel framing shall be vertical or level within the limits specified in AISC Specifications and Standards.
G. Bolted Connections: Bolts shall be driven accurately into the holes without damaging the thread. Bolt heads shall be protected from damage during driving. Bolt heads and nuts shall rest squarely against the metal. Where structural members have sloping flange faces, bolted connections shall be provided with approved beveled washers to afford square seating for bolt heads or nuts. Bolt threads for unfinished bolts shall be nicked to prevent the nuts from backing off. Unfinished bolts transmitting shear shall be threaded to such length so that not more than one thread will be within the grip of the metal. The bolts shall be of the length that will extend entirely through but not less than 1/4 in. beyond the nuts. Bolt heads and nuts shall be drawn tight against the Work with a suitable wrench not less than 15 in. long. Bolt heads shall be tapped with a hammer while the nut is being tightened.

1. Where high-strength bolts are used, an approved calibrated manual or power torque wrench shall be used to obtain the proper torque and tension as recommended by the manufacturer of the bolts.

H. Welded Connections: Workmanship of welds shall conform to the requirements of AWS D1.1 and D1.4, except as modified and supplemented herein. Before welding, particular attention shall be paid to surface preparation, fit up and cleanliness of surface to be welded.

1. All welding shall be done by manual shielded metal-arc welding with covered electrodes, by submerged arc welding or by flux core arch welding.

2. The heat input, length of weld and sequence of weld shall be controlled to prevent distortions. The surfaces to be welded and the filler metals to be used shall be subject to inspection before any welding is performed.

3. All elements of weldments shall be welded together to full strength of the elements as specified hereafter using "V" or "J" grooving except as otherwise shown on the structural drawings. All welds shall be continuous and of full penetration unless otherwise shown on the structural drawings.

4. All groove welds shall be continuous and full penetration welds unless otherwise shown on the design drawings. Welds made without the aid of a backing shall have their roots chipped, ground, or gouged out to sound metal from the second side, before welding is done from the second side."

5. All welds shall be sound throughout. There shall be no crack in any weld or weld pass. Welds may be considered sound if they contain only slight porosity or fusion defects which are well dispersed.

6. Undercut shall not be more than 0.01 in. deep when its direction is transverse to the primary stress in the part that is undercut. Undercut shall not be more than 1/32 in. deep when its direction is parallel to the primary stress in the part that is undercut.

7. Welds shall be free from overlap. All craters shall be filled to the full cross section of the welds.

I. The use of gas-cutting torch in the field for correcting fabrication inaccuracies on any member of the structural framing shall be done only with field approval of the Engineer.

J. Field welding to correct fabricated pieces shall be made only upon the Engineer's approval of the method and procedure to be used. All such Work shall be done in a Workmanlike manner and all unused bolt holes are to be plug welded and ground smoothly.

K. Surfaces of exposed steel tubes or channels not covered by finish materials shall have thru plate ends and other protrusions ground flush and field painted. Approval from the Architect shall be required for all such conditions prior to completion of Work under this Section. This Section applies both to interior and exterior conditions.

L. Installation of chemical epoxy anchors shall be in accordance with manufacturer's requirements. Embedment of anchors into concrete shall be as specified on the Drawings but shall not be less than required by the manufacturer or the following (whichever is more stringent):

<table>
<thead>
<tr>
<th>Anchor Diameter</th>
<th>Minimum Embedment</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot;</td>
<td>3 1/2&quot; minimum</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>4 1/4&quot; minimum</td>
</tr>
<tr>
<td>5/8&quot;</td>
<td>5&quot; minimum</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>6 3/4&quot; minimum</td>
</tr>
<tr>
<td>7/8&quot;</td>
<td>7&quot; minimum</td>
</tr>
<tr>
<td>1&quot;</td>
<td>8 1/4&quot; minimum</td>
</tr>
</tbody>
</table>
3.02 INSPECTION, TESTING, AND CONTROL:

A. All Structural Steel submittals and testing shall be in accordance with the Testing program requirements of Chapter 17 Special Inspections of the Massachusetts State Building Code.

B. A testing and inspecting agency will be employed and paid by the Owner under the supervision of the Architect.

C. The materials and Workmanship to be furnished under this Section shall be subject to inspection in the mill, shop and field by the Architect or the Inspector. Such inspection shall not relieve the Contractor of his responsibility to furnish materials and Workmanship in accordance with the requirements of the Contract Documents.

D. Certified copies, in triplicate, of mill test reports, including names and locations of mills and shops and analysis of chemical and physical properties, of steel to be used on this project shall be submitted to the Architect before delivery to the job site.

E. Manufacturer's certification, in triplicate, of bolts, studs, nuts, and filler metal for welding shall be submitted to the Architect.

F. The Contractor shall maintain quality control of all shop and field Work. Quality control of all welding Work shall consist of meticulous supervision of all welding Work and by non-destructive spot testing at the rate of at least one test per 50 linear feet by each welder, except that full penetration welds shall be tested 100%. Non-destructive testing shall be done by the radiographic, magnetic particle or ultrasonic method whichever is most effective for the joint to be tested. The records of the testing required under this paragraph shall be available for examination by the Architect, and certified copies submitted upon request to the Architect.

G. Field inspection and testing of Work performed under this Section shall be in accordance with testing requirements of 780 CMR, Chapter 17-Special Inspections and the Owner’s Statement of Special Inspections. The Owner’s testing agency shall be present when the Work of this Section is being constructed, and assisted while conducting their Work. Coordinate with the Owner’s designated representative and the testing agency to verify requirements for testing of Work performed under this Section. The Contractor, at his own expense, shall furnish the Inspector, upon request, with the following:

1. A complete set of approved erection drawings and shop drawings.
2. Cutting lists, order lists, material bills, and shipping lists.
3. Information as to time and place of all rollings and shipment of material to shops.
4. Representative sample pieces requested for testing.
5. Full and ample means of assistance for testing materials and proper facilities for inspection of the Work, in the mill, shop, and field.

H. Qualification of the Contractor's high strength bolting procedures and operations shall be as specified under this Section of the Specifications.

1. Each bolting crew working on the project shall be assigned an identification symbol or mark. Each bolting crew shall mark this identification on each joint Worked.
2. The Inspector shall supervise, and keep appropriate records thereof, daily on-site calibration of all pneumatic powered impact wrenches to be used in the actual installation.
3. Calibration of each impact wrench shall consist of tightening, in a hydraulic tension-measuring device, furnished by the Contractor, three bolts of the same size to be used, with a hardened washer under either the bolt head or nut, whichever is turned in tightening.
4. The Inspector shall use a manual torque-tension wrench, furnished by the Contractor, to determine the torque-tension relationship for every combination of impact wrench and bolt size to be used in the Work for the day. These torque values shall be used as the inspection standard in testing the actual installations.
5. The Inspector may require additional calibrations whenever deficiencies occur.
I. Qualification of welding procedures and operations shall be as prescribed in "Standard Qualification Procedures" of the American Welding Society.
   1. All welding operators shall be qualified to perform the type of Work required, except that this provision need not apply to tack welds not later incorporated into finished welds carrying calculated stress. Shop welding operators continuously employed as welders may be accepted on the basis of satisfactory reports dated not more than two years prior to award of this Contract. All other welders must be re-qualified. Welding operators qualified on the job shall use equipment that will be used during construction, under the direct supervision of the Inspector.
   2. All welding operators working on the project shall be assigned an identification symbol or mark. Each welder shall mark or stamp his identification symbol on each weldment completed.
   3. The Contractor shall maintain records of test results of welding procedures and records of welders employed, date of qualification, and identification.

3.03 PAINTING
   A. Surface Preparation:
      1. Oil, grease or salts shall be removed by solvent or steam cleaning as outlined in specification SSPC-SP1. Rust and loose mill scale shall be removed by hand tool cleaning in accordance with SSPC-SP3.
   B. Shop Painting:
      1. The prime coat of paint should be applied as soon as possible after cleaning and before further deterioration of the surface occurs. If the surface rusts or becomes dirty before painting, the surface shall again be cleaned.
      2. Structural steel shall be painted only as noted on the drawings. All steel which is permanently exposed to view inside the building shall be painted. Structural steel shall be given a gray shop coat 2 mils dry with no sagging, by Cadillac No. 246 Rustoleum, Tnemec or Southern Coatings No. 106360 or equal as approved by the Engineer, where specified on Contract Drawings.
      3. No priming shall be done in wet weather unless the steel is protected from dampness.

3.04 GALVANIZING
   A. Where items are specified or noted as galvanized, they shall all be hot dip galvanized after fabrication. Only where size of assembly is too large will galvanizing prior to fabrication be permitted and then only with the permission of the Engineer.
   B. Items to be galvanized shall include, but not be limited to, the following:
      1. All structural steel (including hardware) that will be exposed to the weather, unless otherwise noted on Contract Drawings.
      2. All structural steel located in areas subject to moisture or to corrosive conditions, such as in mechanical rooms.
      3. Any structural steel attached to or embedded in exterior masonry or concrete, including but not limited to, loose lintels, angles, and WT's.
      4. All equipment supports and screen supports above the watertight roof enclosure.
   C. All galvanizing will be performed in compliance with A.S.T.M. Specification A123, A143, A384, A385 and A780 as applicable, with precautions during fabrication. After galvanizing, all materials must be inspected for compliance with these specifications and marked with a stamp indicating the A.S.T.M. number and weight of the zinc coating in ounces per square foot. In addition, the Galvanizer must furnish a notarized statement of compliance with all specifications to the Contractor with a copy to the Engineer.

3.05 PATCHING
   A. Touch up of all bolts, nuts, welds, and abraded surfaces of elements which require painting or galvanizing shall be with the same primer as specified for shop coat.
3.06 RUBBISH REMOVAL

A. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION
PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. All the Contract Documents, including Drawings, General and Supplementary Conditions and Division 1 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK

A. The Work of this Section shall include, but not be limited to, furnishing and installation of the following:

1. Design, materials, manufacture, labor, equipment and performance of all operations necessary to complete all steel joist and joist girder Work as shown on the Drawings and as specified herein.
2. Shop painting of joists, joist girder, bridging and accessories and field touch up.
3. Transportation and erection, including temporary bracing.
4. Required bridging, end bearing materials, bolted or welded connections, special end seats and joist chord extensions.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which effect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
2. Section 02 41 13 – Selective Demolition
3. DIVISION 03 – CONCRETE; including all Sections contained therein
4. DIVISION 04 – MASONRY; including all Sections contained therein
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
9. DIVISION 09 – FINISHES; including all Sections contained therein.
10. Section 21 00 00 – Fire Suppression
11. Section 22 00 00 – Plumbing
12. Section 23 00 00 - HVAC
13. Section 26 00 00 – Electrical
14. DIVISION 31 – EARTHWORK; including all Sections contained therein
15. Section 32 12 00 – Site Improvements

1.04 STANDARDS

A. Except as otherwise specified herein, perform Work in accordance with specifications noted below, including latest editions of applicable specifications, codes, and Standards cited therein, and latest applicable addenda and supplements. Copies of these items shall be kept available in shop and field.


Steel Joist Framing
05 21 00 - 1
B. Any material or operations specified by reference to published specifications of manufacturer or published standard shall comply with said specifications or standards. In case of conflict between referenced specifications, most stringent requirement shall govern. In case of conflict between referenced specifications and Project Specifications, Project Specifications shall govern.

1.05 SUBSTITUTIONS

A. Substitutions for joist sizes, type, connection details or any other modifications proposed by Contractor will be considered by Architect only under following conditions:

1. That request has been made and accepted prior to submission of Shop Drawings.
2. That there is substantial cost advantage or time advantage to Owner; or that proposed revision is necessary to obtain required materials or methods at proper times to accomplish Work in time scheduled.
3. That sufficient sketches, engineering calculations, and other data have been submitted to facilitate checking by Architect, including cost reductions or savings in time to complete Work.

1.06 SUBMITTALS

A. Submit detailed Shop Drawings, including erection drawings and schedules properly cross referenced, showing: joist type, number, sizes, spacing, end bearing details, bridging, cross-bracing, connections, sizes of all welds, headers, anchoring, bearing plates, painting and all other details of fabrication and erection.

1. Shop Drawings shall be reviewed and approved by Contractor prior to submittal to Architect, and again after Architect's review. Drawings submitted to Architect without Contractor's stamp of compliance shall be returned without review by Architect.
2. Except as otherwise noted, approval of Shop Drawings will be for size and arrangement of components. Errors in dimensions shown on Shop Drawings shall be responsibility of Contractor. Check and coordinate steel deck Work with Work of other trades before submitting Shop Drawings.
3. Do not proceed with fabrication of material or performance of Work until corresponding item on Shop Drawing has been approved by Architect.
4. Design for special trusses and joists including but not limited to: barrel vault; bowstring; mansard; jack; and special joists is by the fabricator. Design of all connections are by the manufacturer. Stamped and signed calculations and drawings by a Massachusetts registered Professional Structural Engineer are required and provided by the Manufacturer.

B. Approval of shop drawings will be for size and arrangement of units only. Design of joists and errors in dimensions shown on the Shop Drawings is the responsibility of the Contractor.

C. Certificates:

1. For standard steel joists, K Series, certification that the engineering design and calculations have been investigated by the American Institute of Steel Construction or the Steel Joist Institute and were found to conform to the standard specifications may be submitted in lieu of the specified design computations. For standard steel joists of the K-Series, certification that data obtained from load tests of representative joists have been investigated by the American Institute of Steel Construction or the Steel Joist Institute were found to verify conclusions derived from the analysis of the related design, and calculations may be submitted in lieu of the specified load test data. Certification as required by the standard specifications regarding the steel used shall be furnished for all joists.

1.07 PRODUCT HANDLING

A. Materials shall be delivered to the site in undamaged condition and stored in a manner and at a location that will minimize the formation of water holding pockets, soiling and deterioration of the paint film.

1.08 QUALITY CONTROL

A. All open web steel joist material submittals and testing shall be in accordance with the Testing Program requirements of Chapter 17-Special Inspections of the Massachusetts State Building Code.
B. Qualification of welding procedures and operations shall be as prescribed in "Standard Qualification Procedures" of the American Welding Society.
   1. All welders in shop and field shall be certified to perform the type of Work required within one year of the award of the Contract.

1.09 CORRECTIONS
A. Open web joist Work which has been rejected by the Architect shall be corrected without delay and at no expense to the owner.
B. If arrangements for corrections and/or replacements are not made within seven days after notice of rejection, the Owner shall have the right to have corrections and/or replacements made and charge cost thereof against balance of monies withheld.
C. Acceptance of Work in shop shall not prevent final rejection of Work at site, even after erection, if Work is found to be defective in any way.

1.10 TESTING
A. Field inspection and testing of Work performed under this Section shall be in accordance with testing requirements of 780 CMR, Chapter 17-Special Inspections and the Owner’s Statement of Special Inspections. The Owner’s testing agency shall be present when the Work of this Section is being constructed, and assisted while conducting their Work. Coordinate with the Owner’s designated representative and the testing agency as required to verify requirements for testing of Work performed under this Section.

1.11 PRE-INSTALLATION MEETING
A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 - PRODUCTS

2.01 MATERIALS
A. General: Steel joists shall be in accordance with the standard designations of the Steel Joist Institute and the American Institute of Steel Construction or by other identifying designations with a listing of the properties which must be provided. Joists with properties other than those indicated may be substituted for the joist designated, provided the structural properties are equal to or greater than those of the joists indicated and provided all other specified requirements are met.
B. Open-web steel joists designated in the standard K-Series and LH Series and steel joists designated by any other open-web designation shall conform to SJI-AISC Standard Specifications for Open-Web Steel Joists, K-Series. Joists designated K and LH shall be designed to support the loads given in the standard open-web joist specifications and open-web joists of other designations shall be designed to provide the properties indicated on the Drawings.
C. Joists having special loading conditions or configurations shall be designed in accordance with load and geometry diagrams indicated on drawings.
D. Accessories and fittings, including end supports and bridging shall be in accordance with the standard specifications under which the joists were designed unless indicated otherwise on the Contract drawings.
E. Shop Painting: Joists and accessories shall receive a shop coat as specified in Section 09 91 13 - Painting.

2.02 FABRICATION
A. Holes shall not be made or enlarged by burning, nor will the burning of misplaced holes in the shop or field be acceptable without the approval of the Engineer.
B. Joists with cracked or improper welds or joists otherwise damaged so as to affect their structural properties shall not be used in the Work. Field repair of such damaged joists will be allowed only by special permission and subject to the approval of the Engineer. The method of repairs shall be in accordance with the manufacturer's recommendation.

C. All joists to be bundled with top chord down. Ends of all joists to be even.

PART 3 - EXECUTION

3.01 ERECTION

A. Care shall be exercised at all times in handling and placing of joists. All joists shall be fastened in place and bridging installed prior to receiving any construction loads. The Contractor shall coordinate joist location with the access space and fixture placing requirements of other trades. All joists at columns shall be set in its final location with erection bolts in place. All joists must be connected to the supporting members when left overnight.

B. Bearing surfaces of the joists shall be in the same plane with full bearing on the supporting member and shall be anchored as required in the Steel Joist Institute Standard Specification unless otherwise indicated on the Contract drawings.

C. Bridging size and spacing shall conform to the requirements of the Steel Joists Institute Standard Specification unless otherwise indicated on the Contract drawings. Each line of bridging shall be securely anchored to the walls or supports at the ends of the line and to each joist by welding or bolting. Conformance to the latest OSHA regulations must be strictly adhered to.

D. Deviation from a straight line between ends of any installed joist shall not exceed 3/8 inch for every 10 feet of span length.

E. Laterally support top chords of joists and joist girders both during and after joist erection.

3.02 PAINTING

A. Provide surface preparation and shop primer in accordance with requirements of Section 09 91 13 - Painting.

B. Paint for field use to "touch up" scraped or rusted joist members and to cover all field connections shall be the same type specified for shop primer.

C. No priming shall be done in wet weather unless steel is protected from dampness.

D. All abraded, corroded and field welded areas shall be cleaned and touched up with the sample primer as specified for shop coat.

3.03 RUBBISH REMOVAL

A. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION
PART 1 – GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION OF WORK

A. The Work of this Section shall include, but not be limited to, furnishing and installation of the following:
   1. Roof deck
   2. Closure plates, bent angle plates, sump pans, hanger tabs and accessories for fastening the deck to the steel frame, perimeter closure angles, and closure angles around interior openings.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.
B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following Sections:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
   2. Section 02 41 13 – Selective Demolition
   3. DIVISION 03 – CONCRETE; including all Sections contained therein
   4. Section 04 21 11 – Reinforced Unit Masonry
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
   7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
   8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
   9. DIVISION 09 – FINISHES; including all Sections contained therein.
   10. Section 21 00 00 – Fire Suppression
   11. Section 22 00 00 – Plumbing
   12. Section 23 00 00 - HVAC
   13. Section 26 00 00 – Electrical
   14. DIVISION 31 – EARTHWORK; including all Sections contained therein
   15. Section 32 12 00 – Site Improvements

1.04 QUALITY ASSURANCE

A. Any material or operation specified by reference to the published specifications or a manufacturer, the American Society for Testing and Materials (ASTM), the American Welding Society (AWS), the American Iron and Steel Institute (AISI), the Steel Deck Institute (SDI) or other published standard, shall comply with the requirements of the current specifications or standard listed. In case of a conflict between the referenced specification and the project specification, the project specification shall govern.

B. The Contractor shall furnish a notarized affidavit from an officer of the deck manufacturer listing each material that is used, its required applicable specification and a statement that the materials comply with the applicable specifications. However, such certification shall not relieve the Contractor from the responsibility of complying with any added requirements specified herein.

C. Deck and erection methods shall conform to the handbook of Industrial Loss Prevention, Chapter 75, “Wind Forces and Roof Anchorage Design”, published by Factory Mutual Engineering and Research of Norwood, Massachusetts.
1.05 SUBMITTALS
A. Shop drawings for steel deck shall include the name of the manufacturer and all physical properties.
B. Metal deck layout shop drawing shall be drawn no smaller than 1/8"=1'-0" and Sections showing all edge conditions and conditions around openings, changes in deck direction, etc., shall be clearly detailed drawn to a scale no smaller than 1/12"=1'-0". Welds and crimps as specified herein shall also be detailed on the shop drawings. Shop drawings shall state type of steel and minimum yield point. Shop drawings will not be reviewed without all the above information clearly indicated.
C. No fabrication shall take place until the shop drawings have been reviewed.
D. All welds shall be indicated by AWS "Welding Symbols".
E. The Contractor shall check the shop drawings and shall indicate in colored pencil his correction, holes, etc., modifications for the other trades, and necessary field dimensions before forwarding them to the Architect for correction and review.

1.06 TESTING AND INSPECTION
A. Field inspection and testing of Work performed under this Section shall be in accordance with testing requirements of 780 CMR, Chapter 17-Special Inspections and the Owner's Statement of Special Inspections. The Owner's testing agency shall be present when the Work of this Section is being constructed, and assisted while conducting their Work. Coordinate with the Owner's designated representative and the testing agency to verify requirements for testing of Work performed under this Section.
B. The materials and Workmanship to be furnished under this Section shall be subject to inspection in the shop and field by the Architect or the Official. Such inspection shall not relieve the Contractor of his requirements to furnish materials and Workmanship in accordance with requirements of the Contract Documents.
C. Access shall be provided for inspection of all facilities by the Engineer, Architect or local Building Commissioner. The fabricator shall, when requested, aid the inspectors in carrying out their duties.

1.07 GUARANTEE
A. The Contractor shall furnish to the Owner a written guarantee covering all defects in materials and Workmanship of the Work of this Section that occur within a period of one year from the date of final completion of the building. Should any defects in materials or Workmanship develop within this time, all necessary repairs and replacements shall be made at no additional costs to the Owner.

1.08 PRE-INSTALLATION MEETING
A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 - PRODUCTS

2.01 MATERIALS
A. Metal roof deck shall be one of the following as shown on the Drawings.
   1. Type B, 1 1/2 in. deep, 24" wide, 18 gage, galvanized G90 sheet carbon steel conforming to ASTM A653 Grade C, D or E with a minimum yield point of 33,000 psi with the following minimum properties:
      \[ \begin{align*}
      I_p &= 0.31 \text{ in}^4 \\
      I_n &= 0.32 \text{ in}^4 \\
      S_p &= 0.34 \text{ in} \\
      S_n &= 0.36 \text{ in}
      \end{align*} \]
B. Provide 16% total recycled content of Basic Oxygen Furnace (BOF) produced steel or 67% total recycled content of Electric Arc Furnace (EAF) produced steel.
2.02 MATERIAL FABRICATION
A. Decks shall be fabricated to fit about all roof openings. Special 18-gauge minimum overlapping edge pieces with one rib or 18-gauge channel shall be used at all edges, parallel to the span where the deck is continuous, wherever the centerline of a regular rib does not occur within two inches (2") of the edge. On the sides of all openings, parallel to deck, provide a similar channel or single ribbed piece. Flat bearing must be provided at all edges of the roof and around all openings, so nailers or metal curbs will have solid bearing.
B. All deck must be shop fabricated to proper lengths and delivered to the job with durable identification corresponding to the shop drawings.
C. Deck shall be fabricated in three span lengths or longer.
D. The Contractor shall submit complete calculations to the Engineer. Calculations shall verify ability of the deck to support all design loads.

2.03 ACCESSORIES
A. Provide minimum 16 gauge sheet steel closures with return lip and cover plates, to close panel end conditions where panels end, change direction, or abut.

2.04 HANDLING AND STORAGE
A. Handle and stack materials carefully in order to prevent deformation or damage. During unloading and hoisting, extra care shall be taken to prevent damage to ends and sides of individual panels. If panels are to be stored prior to installation, they shall not be placed in direct contact with ground and shall be protected from elements and dry. If mud, dirt, or other foreign matter is accumulated on panels, such accumulation shall be completely removed prior to erection. All deformed or damaged panels shall be removed from the site and replaced at no additional expense to the Owner.

PART 3 - EXECUTION
3.01 ERECTION
A. Metal decking panels and accessories shall be erected and mechanically fastened for diaphragm action as specified.
B. NOTE: Penetration through metal decking panels for hangers or hanger attachment devices is prohibited.
C. Metal decking panels shall be shipped to the field cut to the proper length. All notching at column bevel cuts or other similar fabrication shall be done by metal decking erector.
D. Holes and openings which are located and dimensioned on the structural drawings shall be cut by the metal decking erector. Holes required for Work by other trades will be located and cut by the respective trades. All openings cut in the metal deck panels shall be reinforced by the metal deck supplier. No opening shall be cut in metal decking panels unless shown on the structural drawings. Refer to OSHA Standards for additional requirements for deck penetrations.
E. All cutting of metal decking panels shall be done in a Workmanlike fashion by power shears, gas-torch cold chisel, or other means reviewed by the Architect.
F. Metal decking panels shall be placed on support steel and accurately aligned to final position before being permanently fastened. All metal roof deck panels shall have a minimum bearing of two inches (2") on the supporting steel.
G. If the supporting steel framework is not in proper alignment, or at the proper level, the metal decking erector shall notify the General Contractor for corrective action. The metal decking panels shall not be installed until the necessary corrections have been made.
H. Metal decking panels shall rest tightly on the flange of beams or girders of any other support surfaces.
I. Mechanically fasten roof deck using 36/7 pattern minimum if not otherwise noted on the Drawings. Each deck piece shall be equivalently fastened to the piece it overlaps at every rib. Side laps shall be fastened with three (4) No. 10 self-tapping screws between all supports @ roof deck and either crimped or welded @ 4 locations between supports @ the floor deck. Where deck bears on steel and the span is parallel to the supporting steel at edges of the roof, around openings, and where deck changes direction, etc., similar screw fastening shall be provided not over 6” on center.

1. Mechanical Fasteners shall comply with the following material and performance characteristics:
   a. Material: AISI 1070 modified
   b. Hardness: Minimum Rockwell Hardness C 54.5
   c. Strength: Minimum tensile strength 285 ksi; minimum shear strength 175 ksi
   d. Design and Manufacture: Knurled shank with forged ballistic point. Manufacturing process shall ensure steel ductility and prevent development of hydrogen embrittlement.
   e. Washers:
      1) For steel bar joist framing: Minimum 12 mm (0.472 in) steel washers
      2) For structural steel framing: Minimum 15 mm (0.591 in) steel washers
   f. Corrosion Resistance:
      1) For steel roof decks with waterproofing membrane: 5 micron zinc electroplated in accordance with ASTM B 633 SC1 Type III
      2) For exposed steel roof decks: Minimum AISI 304 stainless steel sealing caps with bonded neoprene washer shall be installed over each fastener
   g. Design Requirements:
      1) ICC-ES AC43 or SDI method for diaphragm shear strength and stiffness and in compliance with the 2009 International Building Code.
      2) FM wind uplift resistance or as indicated on drawings
      3) UL fire classification
   h. Approved Types:
      1) For use with steel bar joist and light structural steel framing supports with top chord or flange thicknesses at least 1/8" and up to 1/4" thick: Hilti X-EDNK22 THQ12 or approved equal
      2) For use with steel bar joist and light structural steel framing supports with top chord or flange thicknesses at least 3/16” and up to 3/8” thick: Hilti X-EDN19 THQ12 or approved equal
      3) For use with structural steel framing supports with top flange thicknesses ¼” thick or greater: Hilti X-ENP-19 L15 or approved equal

J. Roof deck shall be fastened to adjacent deck sheets at side laps with mechanical side lap fasteners with the following requirements:

1. Drive mechanical sidle lap connectors completely through adjacent lapped roof deck sheets to achieve positive engagement of adjacent sheets with a minimum of three thread penetration.
2. Material: ASTM A 510 Grade 1022
3. Hardness: Minimum Vickers Surface Hardness of 450 HV0.3
4. Design and Manufacture: Hex washer head undercut with reverse serrations; self-piercing or stitch point at center.
5. Corrosion Resistance:
   a. For roof decks with waterproofing membrane: 5 micron zinc electroplated in accordance with ASTM B 633 SC1 Type III.
   b. For exposed steel roof decks: AISI 410 or 304 stainless steel with bonded neoprene washer.

K. Roof deck design requirements shall comply with the following:

1. ICC-ES AC43 or SI method for diaphragm shear strength and stiffness in accordance with the 2009 International Building Code.
2. In addition to the above requirements, the Contractor shall submit written documentation that the proposed steel roof deck system complies with requirements of the following recognized code approval or testing agencies. The Work of this Section shall not commence prior to submittal, and approval of, the Contractor’s written documentation of steel roof deck system compliance with the following minimum Factory Mutual Research Laboratory standards:
   a. F.M. 1-90 wind uplift resistance in roof field
   b. F.M. 1-135 wind uplift resistance in perimeter areas
   c. F.M. 1-195 wind uplift resistance in corner areas

L. Roof deck connector types shall be as follows:
   1. Hilti S-SLC01 M HWH Sidelap Connector
   2. Hilti S-SLC02 M HWH Sidelap Connector
   3. Hilti S-MD 10-16 x ¾ HWH No. 3 Stainless Steel Screws

3.02 RUBBISH REMOVAL

A. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.
SECTION 05 50 00  
METAL FABRICATIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS
A. All the Contract Documents, including Drawings, General Conditions, and all Sections of Division 1- General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK
A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:
   1. Concrete filled steel bollards
   2. Galvanized steel channel at perimeter opening of sectional overhead door
   3. Chain link fence and gates
   4. Bearing plates, leveling plates, and rough hardware required to complete the Work of this Section
   5. Hot dip galvanizing and shop priming of miscellaneous metal materials
B. Items to be Furnished Only: Furnish the following items for installation by the designated Sections:
   1. Section 03 30 00 – Cast-in-Place Concrete: Anchor rods, inserts and pipe sleeves required to attach items of miscellaneous metals to concrete
   2. Section 04 20 00 – Unit Masonry: Loose steel angle lintels for all openings in masonry walls, and anchors, blocking, plates, anchor bolts, and ties to be built into masonry
C. Items to Be Installed Only: Install the following items as furnished by the designated Sections:
   1. Section 03 30 00 – Cast-in-Place Concrete: Concrete fill at steel bollards

1.03 RELATED WORK SPECIFIED ELSEWHERE
A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.
B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
   2. Section 02 41 13 – Selective Demolition
   3. DIVISION 03 – CONCRETE; including all Sections contained therein
   4. DIVISION 04 - MASONRY; including all Sections contained therein
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
   7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
   8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
   9. DIVISION 09 – FINISHES; including all Sections contained therein.
   10. Section 21 00 00 – Fire Suppression
   11. Section 22 00 00 – Plumbing
   12. Section 23 00 00 - HVAC
   13. Section 26 00 00 – Electrical
   14. DIVISION 31 – EARTHWORK; including all Sections contained therein
   15. Section 32 12 00 – Site Improvements

Metal Fabrications
05 50 00 - 1
1.04 QUALITY ASSURANCE
A. Reference Standards:
   2. ASTM A - 569: Specification for Steel, Carbon (0.15 maximum percent), Hot-rolled Sheet and Strip, Commercial Quality.
B. Provide the services of a Professional Engineer, registered in the State of Massachusetts to design and certify that the Work of this Section meets or exceeds the performance requirements specified in this Section. Engineer shall be experienced in providing engineering services of the kind indicated that have resulted in the successful installation of metal fabrications similar in material, design, and extent to that indicated for this project.
   1. Items requiring an Engineer's certification include, but are not limited to, the following:
      a. Miscellaneous bearing plates
C. Shop fabricate Work to the greatest extent possible. Clearly label pieces in shop to facilitate field assembly.
E. Certifications:
   1. Submit certification that the shop painting has been done in accordance with specifications.
   2. Submit certificate of compliance from galvanizer.

1.05 SUBMITTALS
A. Submit manufacturer's product data, installation instructions, use limitations, and recommendations for each material used. Provide certifications stating that materials comply with requirements.
B. Submit large scale shop drawings for fabrication, installation and erection of all parts of the Work. Provide plans, elevations, and details of anchorages, connections and accessory items. Provide installation templates for Work installed by others.
C. Take accurate field measurements before preparation of shop drawings and fabrication. Allow for field cutting and fitting where taking field measurements before fabrication is not possible. Do not field cut or fit items which have been hot-dip galvanized after fabrication.
D. Submit professionally prepared calculations and certification of the performance of this Work. Show how design load requirements and other performance criteria have been satisfied. Calculations shall be stamped and signed by a professional Engineer registered in the Commonwealth of Massachusetts.

1.06 DELIVERY, STORAGE AND HANDLING
A. All materials shall be carefully handled and stacked to prevent deformation or damage. All miscellaneous steel members shall be carefully stored on substantial timbers and blocking, so arranged that the steel will be free from the earth and properly drained, preventing any spattering or accumulation of water in or about the steel. Care shall be taken to prevent damage to the shop coat of paint and prevent the accumulation of mud dirt or other foreign matter on the steel. Such accumulation shall be completely removed prior to erection.

1.07 PROJECT CONDITIONS
A. Do not permit use of ladders, handrails, guardrails, counters or other Work until Work is completely and fully installed and ready to assume its intended design loads. Do not permit overloading of any miscellaneous metal system.
1.08 SOURCE QUALITY CONTROL
   A. The registered engineer as referenced in Paragraph 1.05D above shall make periodic visits to the site to inspect and test as necessary the stair, handrail, and other metal Work assemblies. After completion of the Work and based on these inspections, an affidavit stamped with the seal of the engineer is to be issued. The affidavit shall state that the Work has been installed in accordance with his/her design.

1.09 PRE-INSTALLATION MEETING
   A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 - PRODUCTS

2.01 MATERIALS AND PRODUCTS
   A. Steel Shapes: Steel shapes shall conform to the requirements of Standard Specifications for Structural Steel, ASTM A - 36. All necessary holes and sinkages shall be provided for attaching hardware or other items, and all anchorage for attachment to adjacent construction shall be included.
   B. Steel Tubing: ASTM A500 or A501, hot or cold rolled.
   C. Steel Sheet: ASTM A366, A570 or A611, of grade required for design loading.
   D. Steel Pipe: ASTM A53, black schedule 40 or 80 for 3" diameter pipe and under and schedule 80 for all pipe over 3" in diameter. Type and grade as required for design loading.
   E. Iron Castings: ASTM A47 or A48, grade and class are manufacturer's option.
   F. Grout: Pre-mixed, non-staining, non-corrosive, non-shrink, non-metallic cement based grout requiring only the addition of water. Grout shall exhibit shrinkage compensation characteristics in both the plastic and hardened states, and conform with ASTM C1107, "Grade C", CRD-C621-91, Standard Specification for Packaged Dry Hydraulic Grout – Non-Shrink. One of the following grouts, or Engineer approved substitute, may be used:
      1. "Five Star Grout 100 by Five Star Products Inc."
      2. "SikaGrout 212 as manufactured by Sika Corporation."
      3. "Masterflow 928 by Master Builders, Inc.
   G. Bolts and Fasteners: ASTM A307 and other types as appropriate and approved by Architect.
   H. Shop Paint: Shop paint shall be Modified Alkyd primer equal to Tnemec No. 10-99G Green Metal Primer, Dupont 681 FD Primer or Hempel Primer 1205.
   I. Field Painting: Surface preparation and field painting shall be as specified in Section 09 91 13 - Painting.
   J. Aluminum: Provide alloy and temper recommended by aluminum producer or finisher for the type of use and finish indicated:
   K. Expansion Fastening Systems: Expansion bolts shall be HILTI KWIK bolts, or Architect approved equal by Powers Fastening, Inc. or ITW Ramset/Redhead. Install bolts in accordance with the approved manufacturer's written requirements. Provide minimum 1/2 inch diameter bolts with 3-1/4 inch embedment unless otherwise indicated.
2.02 GALVANIZED STEEL FABRICATION

A. General Fabrication: Fabricate Work to be straight and true, plumb, level and square and to sizes, shapes, and profiles indicated on approved shop drawings. Ease exposed edges. Cut, reinforce, drill and tap metalwork as necessary for proper assembly and use.

1. Fabricate all miscellaneous metal supports, brackets, braces and the like required to fully complete the Work of this project.
2. Coordinate miscellaneous metal requirements with other specification Sections to ensure proper interface of various parts of the Work.
3. Obtain loading requirements from suppliers of Work to be supported and design and fabricate support systems with factor of safety of at least 6.

B. Work Exposed To View: Take special care in choosing materials that are smooth and free of blemishes such as pits, roller marks, trade names, scale and roughness. Fabricate Work with uniform, hairline tight joints. Form welded joints and seams continuously and grind flush and smooth to be invisible after painting. For exposed fasteners, use hex head bolts or Phillips head machine screws.

C. All steel to be installed in or on exterior portions of building, or otherwise attached thereto, including but not limited to, steel framing members at exterior soffits, channels, lintels, shelf angles, stabilization angles, ladders, bolts, washers, and other hardware, shall be coated by hot-dip process after fabrication in accordance with requirements of ASTM A 123 for fabricated components, and ASTM A 153 for hardware. All hot-dipped galvanized fabricated steel components and hardware shall be inspected, and marked with a stamp indicating compliance with the respective ASTM standard for the number of ounces of zinc per square foot of steel, in accordance with requirements of the referenced standards. Zinc for galvanizing shall be applied by the hot-dip process, Duragalv® by Duncan Galvanizing, or Architect approved equal. The galvanizing bath shall contain high-grade zinc, nickel, and other earthly materials. Galvanizing shall exhibit a rugosity (smoothness) not greater than 4 rug (16-20 microns of variation) when measured by a profilometer over a 1 inch straight line on the surface of architectural and structural elements that are less than 24 pounds per running foot. Profilometer shall be capable of operating in 1 micron increments.

1. Galvanizing shall be performed by a company with a minimum of five years experience in the successful application of hot-dip galvanizing utilizing the dry kettle process. Use of the wet kettle process shall not be allowed. The Architect shall have the right to inspect and approve or reject the galvanizer/galvanizing facility. The galvanizer/galvanizing facility must have an ongoing Quality Control/Quality Assurance program acceptable to the Architect which has been in effect for a minimum of five years and shall provide the Architect with process and final inspection documentation.
2. Touch-up damaged galvanizing after installation using organic zinc coating complying with ASTM A 780 and as recommended by galvanizer.
3. Fabricator shall provide a notarized statement from the galvanizer, along with a description of the material processed, indicating that all work has been done in conformance with this specification prior to receiving payment. All items of Work noted or specified to be galvanized shall be galvanized after fabrication. Where size of assembly is too large for galvanizing, only these assemblies will be galvanized prior to fabrication. Submit galvanizer’s certification that shop drawings for metal fabrications to receive metal coatings have been reviewed and that fabrications are acceptable to galvanizer for proper application of galvanizing and metal coatings. All drawings should be stamped by the galvanizer to indicate approval of design for galvanizing.

Metal Fabrications

05 50 00 - 4
4. Provide factory-applied prime coat, Primergalv, by Duncan Galvanizing, or Architect approved equal. Prime coat shall be certified VOC compliant, conforming to applicable regulations and EPA standards. Apply primer within 12 hours after galvanizing at the same facility where the galvanizing is done in a controlled environment meeting applicable environmental regulations and as recommended by the primer coating manufacturer. Blast cleaning of the surface is unacceptable for surface preparation by means of blast cleaning shall not be allowed. Coatings shall meet or exceed the criteria for the following categories as stipulated by the coatings manufacturer:
   a. Abrasion: CS17 Wheel, 1,000 grams load, in accordance with ASTM D 4060
   b. Adhesion: 5 mm Crosshatch, in accordance with ASTM D 3359, Method B
   c. Humidity: ASTM D 4585
   d. Salt Spray (Fog): ASTM B 117

D. Painting and Preparation of Non-Galvanized Steel Products:
   1. Thoroughly clean all steel of all loose mill scale by power wire-brushing or sand blasting. Remove all rust, dirt, weld flux, weld splatter and other foreign matter by wire brushing or scraping (power wire brushing if necessary). Grind smooth any sharp projections. Oil and grease deposits shall be removed by solvent.
   2. All steel members, except galvanized items, after they are prepared, shall be painted before shipping. All surfaces shall be painted, except machine surfaces, surfaces which are to be welded and surfaces to be encased in concrete. Paint shall be applied thoroughly and evenly on the surfaces and worked into the joints and other open surfaces. Surfaces inaccessible after assembly shall be given two coats. Painting materials shall be as follows:
      a. Cleaned steel shall receive one coat of shop applied, two-component, moisture-cured, urethane based, zinc-rich organic coating applied at rate of 3.0 - 3.5 mil DFT, as manufactured by Benjamin-Moore, or Architect approved equal.

2.03 CONCRETE FILLED STEEL BOLLARDS
   A. Pipe shall be welded and seamless galvanized steel pipe with plain ends and welded cap, conforming to A.S.A. Pipe Schedule Fort (40), ASTM A-120. Shall be 4 in. outside diameter with 0.258 in. nominal wall thickness, 14.62 pounds per linear foot.
   B. Concrete for filling bollards shall be three 3,000 psi in 28 days. Paint shall be specified in Section 09 91 13 – Painting, color to be selected by the Architect.

2.04 CHAIN LINK FENCE AND GATES
   A. Provide chain link fence, Acorn 135, as manufactured by Acorn Wire & Iron Works, Inc., or Architect approved equal by California Wire Products Corporation or Newark Wire Works Inc. The chain link fence shall comply with the following characteristics:
      1. All wire heavy duty type shall be constructed of 6-gauge steel wire woven into 2 in. diamond mesh securely clinched into 1-1/2 in. x 3/4 in. channel frames.
      2. Vertical frames shall have 3/8 in. bolt holes 18 in. O.C.
      3. All joints shall be mortised and tenoned
      4. Center reinforcing bar shall be 1-1/2 in. x 3/4 in. channel tenoned to side frames.
      5. All wires shall pass through center bar.
      6. Flat bar post to be 5/16 in. x 2-1/2 in. with 3/8 in. bolt holes to match partition.
      7. Top capping bar shall be 3 in. x 4.1 lbs. channel with 5/16 in. "U" bolts at 2'-4" O.C. anchored to walls.
      8. Corner posts shall be 1-3/4 in. x 1-3/4 in. angles with 3/8 in. bolt holes to match partition.
      9. Floor sockets shall be 2-1/2 in. high with set screw adjustment.
      10. Hinged door frames shall be 1-1/2 in. x 3/4 in. channel with 1-1/2 in. x 1/8 in. flat bar to cover three sides; 1-58 in. x 7/8 in. 1/8 in. angle riveted to lock side. Each door shall have 1-1/2 in. pairs butt hinges riveted to door and hinge bar.
      11. All doors shall have substantial mortise type cylinder locks operated by key outside, recessed knob inside.
      12. Provide all bolts, hardware, and accessories for complete installation.
13. Field bracing shall be furnished by erector.
14. All finishes shall be electrostatic sprayed enameled with color to be selected by the Architect from manufacturer’s approved standard colors.

B. Fabricate chain link fence from components of sizes not less than specified, or larger-size components in accordance with the approved wire mesh item manufacturer’s design requirements. Provide all bolts, hardware, and accessories required for complete installation.
   1. Fabricate wire mesh items to be readily disassembled.
   2. Weld corner joints of framing and grind smooth, leaving no evidence of joint.

C. Fabricate chain link fence with cutouts for pipes, ducts, beams, and all other penetrations as indicated on the Drawings. Coordinate fabrication and installation with all other related Work. Finish edges of cutouts to provide a neat, protective edge.
   1. Securely clinch mesh to framing.
   2. Fabricate framing with mortise and tenon corner construction.
      a. Provide horizontal stiffeners as indicated or otherwise required by panel height in accordance with the approved chain link fence manufacturer’s written recommendations. Weld horizontal stiffeners to vertical framing.
      b. Fabricate all intersections using intersection posts and the approved manufacturer’s standard connecting clips and fasteners.
      c. Fabricate partition and gate framing with slotted holes for connecting adjacent panels.
   3. Fabricate chain link fence with 3 in. of clear space between finished floor and bottom horizontal framing.
   4. Fabricate chain link fence with bottom horizontal framing flush with finished floor.
   5. Align bottom of gates with bottom of adjacent panels.
      a. For gates that do not extend full height of partition, provide transom over door, fabricated from same mesh and framing as partition panels.
   6. Mortise, reinforce, drill, and tap gates and framing in accordance with the approved chain link fence manufacturer’s design requirements for hardware installation.

D. Hot-dip galvanize wire mesh items in accordance with requirements of ASTM A 123. Hot-dip galvanize hardware in accordance with requirements of ASTM A 153.

2.05 MISCELLANEOUS FRAMING AND SUPPORTS
A. Provide all miscellaneous framing and supports.
B. Provide miscellaneous bearing and leveling plates as required to provide fully functional systems in accordance with requirements of this Section and the Contract Documents.

2.06 ROUGH HARDWARE
A. Provide standard and custom fabricated bolts, anchors, hangers, dowels and other miscellaneous metal items as needed to properly complete the Work of the project.

PART 3 - EXECUTION
3.01 INSTALLATION / ERECTION
A. Provide suitable anchors and fasteners to connect miscellaneous metal items to other construction. Provide setting templates and diagrams and coordinate with other Work so that adequate anchor bolts, blocking and bracing is in place and accurately located. Beginning Work means Installer accepts substrates and conditions.
B. Set Work accurately and plumb, level and aligned. Make field assembly and connections with the same level of quality as shop fabricated Work.
C. For bearing and leveling plates, clean concrete and masonry bearing surfaces and roughen to improve bond. Thoroughly clean steel bearing surfaces. Set loose plates on shims or wedges. Level and plumb Work, then tighten anchor bolts. Cut off protruding shims and wedges and pack voids solidly with grout.

D. Chain Link Fence:
1. Anchor wire mesh partitions to floor with 3/8 in. diameter, post-installed expansion anchors at 12 in. o.c. through floor shoes located at each post and corner. Adjust wire mesh partition posts in floor shoes to achieve level and plumb installation. Partitions shall extend full height to underside of steel deck above.
2. Anchor wire mesh partitions to walls at 12 in. O.C. through back corner panel framing and as follows:
   a. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
   b. For hollow masonry anchorage, use toggle bolts.
3. Secure top capping bars to top framing channels with 1/4 in. in bolts spaced not more than 28 in. O.C.
4. Provide line posts as shown on the architectural drawings.
5. Where standard-width wire mesh partition panels do not fill entire length of run, provide adjustable filler panels to fill openings.
6. Install gates complete with hardware.
7. Adjusting and Cleaning:
   a. Adjust doors to operate easily without binding.
   b. Check and readjust operating hardware items just before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work including doors and framing that are warped, bowed, or otherwise unacceptable.
   c. Clean field welds, bolted connections, and abraded areas; repair galvanizing in accordance with requirements of ASTM A 780.

3.02 TOLERANCES

A. The following allowable installed tolerances are allowable variations from locations and dimensions indicated by the Contract Document and shall not be added to allowable tolerances indicated for other Work.
   1. Allowable Variation from True Plumb: ± 1/8” in 20'-0"
   2. Allowable Variation from True Level: ± 1/8” in 20'-0"
   3. Allowable Variation from True Line: ± 1/8” in 20'-0"

3.03 RUBBISH REMOVAL

A. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION
SECTION 05 52 13

STEEL HANDRAILS AND GUARDRAILS

PART 1 - GENERAL

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

1.02 DESCRIPTION OF WORK
A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:
   1. Steel handrails, guardrails, and plates
   2. Rough hardware required to complete the Work of this Section
   3. Hot dip galvanizing and shop priming of exterior handrails and guardrails
B. Items to be Furnished Only: Furnish the following items for installation by the designated Sections:
   1. Section 03 30 00 – Cast-in-Place Concrete: Anchor rods, inserts and pipe sleeves required to attach handrails and guardrails to concrete

1.03 RELATED WORK SPECIFIED ELSEWHERE
A. Carefully examine all of the Contract Documents for requirements which affect the Work of this Section.
B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
   2. Section 02 41 13 – Selective Demolition
   3. DIVISION 03 – CONCRETE; including all Sections contained therein
   4. DIVISION 04 - MASONRY; including all Sections contained therein
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
   7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
   8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
   9. DIVISION 09 – FINISHES; including all Sections contained therein.
   10. Section 21 00 00 – Fire Suppression
   11. Section 22 00 00 – Plumbing
   12. Section 23 00 00 - HVAC
   13. Section 26 00 00 – Electrical
   14. DIVISION 31 – EARTHWORK; including all Sections contained therein
   15. Section 32 12 00 – Site Improvements

1.04 QUALITY ASSURANCE
A. Reference Standards:
   2. ASTM A569: Specification for Steel, Carbon (0.15 maximum percent), Hot-rolled Sheet and Strip, Commercial Quality.

B. Provide the services of a Professional Engineer, registered in the State of Massachusetts to design and certify that the Work of this Section meets or exceeds the performance requirements specified in this Section. Engineer shall be experienced in providing engineering services of the kind indicated that have resulted in the successful installation of metal fabrications similar in material, design, and extent to that indicated for this project.

1. Items requiring an Engineer's certification include, but are not limited to, the following:
   a. Handrails and guardrails

C. Shop fabricate Work to the greatest extent possible. Clearly label pieces in shop to facilitate field assembly.


E. Certifications:
   1. Submit certification that the shop painting has been done in accordance with specifications.
   2. Submit certificate of compliance from galvanizer.

1.05 SUBMITTALS

A. Submit manufacturer's product data, installation instructions, use limitations, and recommendations for each material used. Provide certifications stating that materials comply with requirements.

B. Submit product test reports from a qualified independent 3rd party testing agency indicating each type and class of panel system complies with the project performance requirements, based on comprehensive testing of specified products. Test reports required are:
   1. Rate of Burning (ASTM D 635)
   2. Self-Ignition Temperature (ASTM D 1929)
   3. Density of Smoke (ASTM D 2843)
   4. Flame spread and Smoke developed testing (ASTM E 84)
   5. Room Corner Burn Test (NFPA 286)
   6. Extent of Burning (UL 94)
   7. Impact strength (ASTM D 3763)
   9. UPITT Test for Combustion Product Toxicity
   10. Dynamic environmental testing (ASTM standards D 5116 and D 6670)

C. Submit large scale shop drawings for fabrication, installation and erection of all parts of the Work. Provide plans, elevations, and details of anchorages, connections and accessory items. Provide installation templates for Work installed by others.

D. Take accurate field measurements before preparation of shop drawings and fabrication. Allow for field cutting and fitting where taking field measurements before fabrication is not possible. Do not field cut or fit items which have been hot-dip galvanized after fabrication.

E. Submit professionally prepared calculations and certification of the performance of this Work. Show how design load requirements and other performance criteria have been satisfied. Calculations shall be stamped and signed by a professional Engineer registered in the Commonwealth of Massachusetts.

1.06 DELIVERY, STORAGE AND HANDLING

A. All materials shall be carefully handled and stacked to prevent deformation or damage. All miscellaneous steel members shall be carefully stored on substantial timbers and blocking, so arranged that the steel will be free from the earth and properly drained, preventing any spattering or accumulation of water in or about the steel. Care shall be taken to prevent damage to the shop coat of paint and prevent the accumulation of mud dirt or other foreign matter on the steel. Such accumulation shall be completely removed prior to erection.
1.07 PROJECT CONDITIONS
   A. Do not permit overloading or use of the Work of this Section until all Work is completely and fully installed and ready to assume its intended design loads.

1.08 SOURCE QUALITY CONTROL
   A. The registered engineer as referenced in Paragraph 1.05E. above shall make periodic visits to the site to inspect and test as necessary the stair, handrail, and other metal Work assemblies. After completion of the Work and based on these inspections, an affidavit stamped with the seal of the engineer is to be issued. The affidavit shall state that the Work has been installed in accordance with his/her design.

1.09 PRE-INSTALLATION MEETING
   A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 - PRODUCTS

2.01 MATERIALS AND PRODUCTS
   A. Steel Shapes: Steel shapes shall conform to the requirements of Standard Specifications for Structural Steel, ASTM A-36. All necessary holes and sinkages shall be provided for attaching hardware or other items, and all anchorage for attachment to adjacent construction shall be included.
   B. Steel Tubing: ASTM A500 or A501, hot or cold rolled.
   C. Steel Sheet: ASTM A366, A570 or A611, of grade required for design loading.
   D. Steel Pipe: ASTM A53, black schedule 40 or 80 for 3” diameter pipe and under and schedule 80 for all pipe over 3” in diameter. Provide type and grade necessary to comply with specified design loading.
   E. Iron Castings: ASTM A47 or A48, grade and class are manufacturer’s option.
   F. Bolts and Fasteners: ASTM A307 and other types as appropriate and approved by Architect.
   G. Concrete: Comply with requirements of Section 03 30 00 – Cast-in-Place Concrete.
   H. Shop Paint: Shop paint shall be Modified Alkyd primer equal to Tnemec No. 10-99G Green Metal Primer, Dupont 681 FD Primer or Hempel Primer 1205.
   I. Field Painting: Surface preparation and field painting shall be as specified in Section 09 91 13 - Painting

2.02 FABRICATION
   A. General Fabrication: Fabricate Work to be straight and true, plumb, level and square and to sizes, shapes, and profiles indicated on approved shop drawings. Ease exposed edges. Cut, reinforce, drill and tap metalwork as necessary for proper assembly and use.
      1. Fabricate all miscellaneous metal supports, brackets, braces and the like required to fully complete the Work of this project.
      2. Coordinate miscellaneous metal requirements with other specification Sections to ensure proper interface of various parts of the Work.
      3. Obtain loading requirements from suppliers of Work to be supported and design and fabricate support systems with factor of safety of at least 6.
B. Work Exposed to View: Take special care in choosing materials that are smooth and free of blemishes such as pits, roller marks, trade names, scale and roughness. Fabricate Work with uniform, hairline tight joints. Form welded joints and seams continuously and grind flush and smooth to be invisible after painting. For exposed fasteners, use hex head bolts or Phillips head machine screws.

C. All steel to be installed in or on exterior portions of building, or otherwise attached thereto, including but not limited to, steel framing members at exterior soffits, lintels, shelf angles, stabilization angles, ladders, and bolts, washers, and other hardware, shall be coated by hot-dip process after fabrication in accordance with requirements of ASTM A 123 for fabricated components, and ASTM A 153 for hardware. All hot-dipped galvanized fabricated steel components and hardware shall be inspected, and marked with a stamp indicating compliance with the respective ASTM standard for the number of ounces of zinc per square foot of steel, in accordance with requirements of the referenced standards. Zinc for galvanizing shall be applied by the hot-dip process, Duragalv® by Duncan Galvanizing, or Architect approved equal. The galvanizing bath shall contain high-grade zinc, nickel, and other earthly materials. Galvanizing shall exhibit a rugosity (smoothness) not greater than 4 rug (16-20 microns of variation) when measured by a profilometer over a 1 inch straight line on the surface of architectural and structural elements that are less than 24 pounds per running foot. Profilometer shall be capable of operating in 1 micron increments.

1. Galvanizing shall be performed by a company with a minimum of five years experience in the successful application of hot-dip galvanizing utilizing the dry kettle process. Use of the wet kettle process shall not be allowed. The Architect shall have the right to inspect and approve or reject the galvanizer/galvanizing facility.

2. The galvanizer/galvanizing facility must have an ongoing Quality Control/Quality Assurance program acceptable to the Architect which has been in effect for a minimum of five years and shall provide the Architect with and final inspection documentation.

3. Touch-up damaged galvanizing after installation using organic zinc coating complying with ASTM A 780 and as recommended by galvanizer.

4. Fabricator shall provide a notarized statement from the galvanizer, along with a description of the material processed, indicating that all work has been done in conformance with this specification prior to receiving payment.

5. All items of Work noted or specified to be galvanized shall be galvanized after fabrication. Where size of assembly is too large for galvanizing, only these assemblies will be galvanized prior to fabrication. Submit galvanizer’s certification that shop drawings for metal fabrications to receive metal coatings have been reviewed and that fabrications are acceptable to galvanizer for proper application of galvanizing and metal coatings. All drawings should be stamped by the galvanizer to indicate approval of design for galvanizing.

6. Provide factory-applied prime coat, Primergalv, by Duncan Galvanizing, or Architect approved equal. Prime coat shall be certified VOC compliant, conforming to applicable regulations and EPA standards. Apply primer within 12 hours after galvanizing at the same facility where the galvanizing is done in a controlled environment meeting applicable environmental regulations and as recommended by the primer coating manufacturer. Blast cleaning of the surface is unacceptable for surface preparation by means of blast cleaning shall not be allowed. Coatings shall meet or exceed the criteria for the following categories as stipulated by the coatings manufacturer:
   a. Abrasion: CS17 Wheel, 1,000 grams load, in accordance with ASTM D 4060
   b. Adhesion: 5 mm Crosshatch, in accordance with ASTM D 3359, Method B
   c. Humidity: ASTM D 4585
   d. Salt Spray (Fog): ASTM B 117

D. Painting and Preparation of Non-Galvanized Steel Products:

1. Thoroughly clean all steel of all loose mill scale by power wire-brushing or sand blasting. Remove all rust, dirt weld flux, weld splatter and other foreign matter by wire brushing or scraping (power wire brushing if necessary). Grind smooth any sharp projections. Oil and grease deposits shall be removed by solvent.

2. All steel members, except galvanized items, after they are prepared, shall be painted before shipping. All surfaces shall be painted, except machine surfaces, surfaces which are to be welded and surfaces to be encased in concrete. Paint shall be applied thoroughly and evenly on the surfaces and Worked into the joints and other open surfaces. Surfaces inaccessible after assembly shall be given two coats. Painting materials shall be as follows:
Steel Handrails and Guardrails

2.03 HANDRAIL, GUARDRAILS, PLATES, AND SUPPORT COMPONENTS

A. Fabricate all interior metal handrails, railings and connections to design, dimensions and details indicated on the Drawings. Exterior railings shall be hot-dipped galvanized, ASA 40 sizes as indicated on the Drawings. Provide members in materials, sizes and profiles indicated, with support elements of size and spacings shown, but not less than required to withstand the following structural loads without exceeding the allowable design Working stress of the material involved, including anchors and connections. Apply each load to produce the maximum stress in each respective component of each metal fabrication.

1. Top rail of guardrail systems and roof safety rail shall be capable of withstanding the following loads applied as indicated:
   a. Concentrated load of 300 lbs applied at any point non-concurrently, vertically downward, or horizontally.
   b. Uniform load of 100 lbs per lineal foot, applied vertically, non-concurrently with 100 lbs per lineal foot horizontal uniform load.
   c. Concentrated and uniform loads above need not be assumed to act concurrently.
   d. Design and fabricate all elements of handrails, guardrails, and support components to provide a maximum deflection of L/240.

2. Handrails not serving as top rails shall be capable of withstanding the following loads applied as indicated:
   a. Concentrated load of 200 lbs applied at any point non-concurrently, vertically downward, or horizontally.
   b. Uniform load of 50 lbs per lineal foot, applied non-concurrently, vertically downward or horizontally.
   c. Concentrated and uniform loads above need not be assumed to act concurrently.

3. Infill area of guardrail systems shall be capable of withstanding a horizontal concentrated load of 200 lbs applied to one square foot at any point in the system including panels, intermediate rails, balusters, or other elements composing the infill area. Load need not be assumed to act concurrently with uniform horizontal loads on the top rails of the railing systems in determining stress on the guard.

4. Fabricate Work to be straight, plumb, level and square.

5. Provide 3/16 in. x 4 in. high continuous steel plate and welded to intermediate posts.

6. Provide brackets, flanges, fittings and anchors for the interconnection of handrail and railing components to other Work. Provide concealed fasteners for the interconnection of handrail and railing components, and for all other connections, except where exposed fasteners are unavoidable.

7. Perform welding to comply with AWS for recommended practices, using method appropriate for metal and finish indicated. Grind exposed welds flush and smooth to blend with adjoining finish metal surfaces.

8. Form bends by use of prefabricated elbow fittings and radius bends, as applicable.

9. Form simple and compound curves by bending members in jigs designed to produce uniform curvature with uniform profile of member throughout entire bend without buckling, twisting or deforming in any way.

10. Steel support elements required for railing systems shall be fabricated using standard or custom bolts, anchors, hangers, dowels and other miscellaneous metal items as needed to satisfy specified loading requirements. Provide malleable iron wall brackets railing brackets, Model 378, as manufactured by Julius Blum, or Architect approved equal.

2.04 ROUGH HARDWARE

B. Provide standard and custom fabricated bolts, anchors, hangers, dowels and other miscellaneous metal items as needed to properly complete the Work of the project.
PART 3 - EXECUTION

3.01 INSTALLATION/ERECTION
   A. Provide suitable anchors and fasteners to connect the Work of this Section to other construction. Provide setting templates and diagrams and coordinate with other Work so that adequate anchor bolts, blocking and bracing is in place and accurately located. Beginning Work means Installer accepts substrates and conditions.
   B. Set Work accurately and plumb, level and aligned. Make field assembly and connections with the same level of quality as shop fabricated Work.
   C. Adjust handrails and guardrails prior to final anchoring and grouting. Plumb posts in both directions. Provide 1-1/2" clearance from inside of handrails to face of walls. Provide wall brackets at spacing shown, or if not shown, at not more than 6'-0" on center. Securely anchor wall brackets into structure or very secure blocking. Connections shall withstand loading specified for handrails and guardrails.

3.02 TOLERANCES
   A. The following allowable installed tolerances are allowable variations from locations and dimensions indicated by the Contract Document and shall not be added to allowable tolerances indicated for other Work.
      1. Allowable Variation from True Plumb: ± 1/8" in 20'-0"
      2. Allowable Variation from True Level: ± 1/8" in 20'-0"
      3. Allowable Variation from True Line: ± 1/8" in 20'-0"

3.03 RUBBISH REMOVAL
   A. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION
PART 1 - GENERAL

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

1.02 DESCRIPTION OF WORK
   A. The Work of this Section includes, but is not limited to, provision and installation of the following:
      1. Pressure treated deck boards and ledger boards at existing dock.
      2. Concealed wood blocking and nailers within gypsum wallboard partitions, walls and ceilings for attachment of equipment, wood blocking for wall mounted shelving, plywood panels and similar items.
      3. Plywood, wood nailers, furring, grounds and blocking for all exterior and interior Work, except Work of Section 07 54 19 – Polyvinyl-Chloride (PVC) Roofing and all related Sections.
      4. Pressure treated wood framing members and plywood for all wood in contact with concrete or masonry.
      5. Fire retardant treated wood framing members and plywood required by codes and ordinances.
      6. Telephone and electrical equipment backing panels.
      7. Wood preservative treatment for lumber and plywood cut in field.
      8. Nails, screws, bolts and fasteners for securing items of rough carpentry installed under the Work of this Section.

1.03 RELATED WORK SPECIFIED ELSEWHERE
   A. Carefully examine all the Contract Documents for requirements which effect the Work of this Section.
   B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
      1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
      2. Section 02 41 13 – Selective Demolition
      3. DIVISION 03 – CONCRETE; including all Sections contained therein
      4. DIVISION 04 – MASONRY; including all Sections contained therein
      5. DIVISION 05 – METALS; including all Sections contained therein.
      6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
      7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
      8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
      9. DIVISION 09 – FINISHES; including all Sections contained therein.
      10. Section 21 00 00 – Fire Suppression
      11. Section 22 00 00 – Plumbing
      12. Section 23 00 00 - HVAC
      13. Section 26 00 00 – Electrical
      14. DIVISION 31 – EARTHWORK; including all Sections contained therein
      15. Section 32 12 00 – Site Improvements

1.04 PURPOSE
   A. The Work of this Section shall be to provide concealed blocking, grounds, nailers, and backing panels, for the Work of this Project. Portions of Work related to this Section include, but are not limited to, toilet accessories, handrails and railings, and telephone and electrical equipment.
B. Coordinate the Work of this Section with the Work specified in Section 06 20 00 - Finish Carpentry and Section 09 22 16 – Non-Structural Metal Framing and Gypsum Board. Determine which type of blocking, wood or metal, is best suited to each situation and provide the appropriate type of blocking. Do not use wood blocking in fire-rated assemblies or other locations prohibited by authorities having jurisdiction.

1.05 QUALITY ASSURANCE

A. Lumber Grading Rules and Wood Species to be in conformance with Voluntary Product Standard PS-20; grading rules of the following associations apply to materials furnished under this Section.
   1. Northeast Lumber Manufacturer's Association, Inc.
   2. Western Wood Products Association.

B. Plywood Grading Rules:

C. Grade Marks: Identify all lumber and plywood by the official grade mark.
   1. Lumber: Grade stamp to contain symbol of grading agency, mill number or name, grade of lumber, species grouping or combination designation, rules under which graded, where applicable and condition of seasoning at time of surfacing.
      a. Type, grade, class and Identification Index.
      b. Inspection and testing agency mark.
   3. Hardwood Plywood: Appropriate grade trademark of the American Plywood Association or other qualified testing and grading agency.

D. Requirements of Regulatory Agencies:

1.06 SUBMITTALS

A. Submit manufacturer's product data, installation instructions, use limitations and recommendations for each material used. Provide certifications demonstrating materials comply with requirements of the Contract Documents.

B. Certifications:
   1. Pressure Treated Wood: Submit certification by treating plant stating chemicals and process used, net amount of salts retained, and conformance with applicable standards.
   2. Pressure Treated Wood: Submit certification for water-borne preservative that moisture content was reduced to 19% maximum, after treatment.
   3. Fire Retardant Treatment: Submit certification by the treating plant that the fire-retardant treatment materials comply with governing ordinances and that the treatment shall not bleed through finished surfaces.
   4. Fire Treated Wood: Submit certification from the supplier of the fire retardant treated lumber or plywood attesting that the wood is Dricon wood or satisfies the following:
      a. All pieces of lumber have been kiln dried to a maximum moisture content of 19% or less after treatment. All plywood shall be dried to a moisture content of 15% after treatment.
      b. The fire retardant chemicals used to treat the lumber were free of halogens, sulfates, ammonium phosphate and formaldehyde.
      c. The fire retardant treated wood does not require brush treatment of end cuts made in the field.
      d. The fire retardant treated wood has an equilibrium moisture content of not more than 25 % when tested in accordance with ASTM D3201 procedures at 95% relative humidity and 80°F.
1.07 DELIVERY STORAGE AND HANDLING
A. Deliver, store and handle in strict compliance with manufacturer’s instructions and recommendations. Protect from moisture and damage. Stack materials to promote air circulation. Protect sheet materials from corner breakage and other damage.

1.08 PRE-INSTALLATION MEETING
A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 - PRODUCTS

2.01 LUMBER
A. Provide kiln dried southern yellow pine or hem-fir construction grade boards, stud grade or no. 2 boards, and structural light framing, complying with applicable requirements of PS 20 “American Softwood Lumber Standards”, and having 19 percent maximum moisture content.

B. Provide above ground lumber and plywood in contact with masonry, concrete and dampproofing that is pressure treated to a level of 0.25 pounds per cubic foot of wood product, with waterborne CCA preservatives in accordance with requirements of AWPA Standard U1 and T1. Pressure treated lumber shall be dried to a maximum moisture content of 15 percent after treatment.

C. Provide UL labeled fire-retardant treated wood in telephone and electrical closets, window framing, and elsewhere as indicated. Provide fire-retardant treatment suitable for interior exposures and complying with AWPA C20. Kiln dry lumber after treatment.

2.02 PLYWOOD
A. Backing panels, interior wall sheathing panels, and continuous or partial partition blocking, shall be APA trademarked, UL labeled, fire-retardant treated, BD, Group 2, Exposure 1 plywood panels not less than 3/4 in. thick at locations of electrical and telephone panels, or 1/2 in. thick for wall sheathing. Panels shall comply with requirements of PS 1. Plywood shall be fire retardant treated to yield a flame spread rating of not more than 25 when tested according to ASTM E84. Kiln dry after treatment to maximum moisture content of 15%.

2.03 FASTENERS AND MISCELLANEOUS MATERIALS
A. Provide size, type, and material appropriate for intended use, as follows:

1. Self-Tapping Screws, surface hardened with a fluoropolymer paint finish equal to Buildex or Stalgard. Threads shall be self-locking to prevent backing out under wind load, vibration or other stress. A 5/8 in. penetration of the screw through the metal deck is required.

2. Bolts:
   a. Bolts, and nuts shall conform to Fed. Spec. FF-B-571a and FF-B-575, as applicable.
   b. Expansion shields shall conform to Fed. Spec. FF-S-325. Shields shall be accurately recessed and, unless otherwise indicated, shall be not less than 2-1/2 in. into concrete or masonry. Devices of Groups IV, V, VI and VII shall not be used in sizes greater than 3/8 in. unless otherwise indicated.
   c. Lag screws or lag bolts shall conform to Fed. Spec. FF-B-561b.
   d. Toggle bolts shall conform to Fed. Spec. FF-B-588b.


B. Provide fasteners with G-90 hot dip galvanized coating, or fluoropolymer coating, at areas of high humidity, including roof blocking and sheathing. Fasteners for use with non-CCA pressure treated lumber, including ACQ Types B and D, CBA-A, and CA-B, shall be stainless steel.

C. Preservative treatment for field cut surfaces of pressure treated blocking and sheathing shall contain 2% copper naphthenate complying with AWPA Standard M4. Material shall be Green No. 10, as manufactured by Cuprinol, or Architect approved equal by WM Barr or Behr.

2.04 FINISHES

A. Paint all surfaces, exposed and concealed, of plywood backing panels at electrical and telephone panels, and mechanical rooms with fire retardant paint in accordance with requirements of Section 09 91 13 - Painting, and the approved manufacturer’s written instructions.

PART 3 - EXECUTION

3.01 INSPECTION

A. The Installer/Erector shall examine substrates, supports, and conditions under which this Work is to be performed and notify General Contractor, in writing, of conditions detrimental to the proper completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected. Beginning Work means Installer accepts substrates and conditions.

3.02 INSTALLATION / ERECTION

A. Strictly comply with National Forest Products Association, Manual for House Framing and building codes, except where more restrictive requirements are specified in this Section or indicated on the drawings.

B. Choose wood members carefully to eliminate split, warped and twisted members. Set Work to required levels and lines with members plumb and true to line with joints neatly and tightly cut and butted. Securely anchor Work in strict compliance with referenced standards and building code nailing schedule. Countersink bolts and other fasteners flush with face of wood to provide a proper substrate for later Work.

C. Blocking shall be provided as necessary for the applications of sheathing, wallboard and other materials or building items, and to provide fire stopping. Blocking shall be cut to fit between framing members and rigidly attached thereto.

D. Saturate cut ends of treated wood with same chemicals used for original treatment.

E. Install nailers and blocking at metal studs as indicated. All wood shall be pressure treated or fire treated as indicated on drawings. Apply two brush coats of same preservative used in original treatment to all sawed or cut surfaces of preservative treated lumber.
   1. Bolt nailers to deck, not over 24 inches on center. Counter sink bolt heads.
   2. Screw nailers to studs, not over 12 inches on center.

3.03 INSTALLATION OF CONSTRUCTION PANELS

A. Reference Standards: Comply with instructions and recommendations of APA, Design and Construction Guide - Residential and Commercial for types of panels, nail size and fastening spacing used and applications indicated.

B. Fasten panels as indicated below:
   1. Backerboards: Screw to framing or expansion bolt to CMU.
   2. Wall Sheathing: Screw to framing or expansion bolt to CMU.

3.04 RUBBISH REMOVAL

A. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION
PART 1 - GENERAL

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

1.02 DESCRIPTION OF WORK
A. The Work of this Section includes, but is not limited to, the following:
   1. Plastic laminate countertop and brackets
   2. Fixed wood bench
   3. Back priming of concealed Work
   4. Shop finishing of exposed Work

1.03 RELATED WORK SPECIFIED ELSEWHERE
A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.
B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
   2. Section 02 41 13 – Selective Demolition
   3. DIVISION 03 – CONCRETE; including all Sections contained therein
   4. DIVISION 04 – MASONRY; including all Sections contained therein
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
   7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
   8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
   9. DIVISION 09 – FINISHES; including all Sections contained therein.
   10. Section 21 00 00 – Fire Suppression
   11. Section 22 00 00 – Plumbing
   12. Section 23 00 00 – HVAC
   13. Section 26 00 00 – Electrical
   14. DIVISION 31 – EARTHWORK; including all Sections contained therein
   15. Section 32 12 00 – Site Improvements

1.04 QUALITY ASSURANCE
B. Softwood lumber shall comply with PS 20 and with applicable grading rules of the respective grading and inspecting agency for the species and product indicated.
C. Plywood shall comply with PS 1/ANSI A 199.1.
D. Hardwood lumber shall comply with National Hardwood Lumber Association (NHLA) rules.
E. Hardwood plywood shall comply with HPVA, PS 51.

F. Provide minimum 42 pounds per cubic foot medium density particleboard complying with requirements of NPA and ANSI 208.1 Standards. Use of hardboard shall not be allowed.

G. Provide minimum 31 pounds per cubic foot to 55 pounds per cubic foot medium density fiberboard (MDF) complying with National Particleboard Association sponsored ANSI A208.2 Medium Density Fiberboard for Interior Use. Moisture content shall be between four and nine percent.

H. All concealed Work in this Section shall be UL labeled fire-retardant treated. Exposed woodwork shall have a flame spread of less than 200. Comply with ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials and AWPA C20 - Structural Lumber Fire Retardant Treatment by Pressure Process.

1.05 SUBMITTALS

A. Certifications:
   1. Submit certification by the treating plant that the fire-retardant treatment materials comply with governing ordinances and that the treatment shall not bleed through finished surfaces.
   2. Submit certification from the supplier of the fire retardant treated lumber or plywood attesting that the wood is Dricon wood or satisfies the following:
      a. All pieces of lumber have been kiln dried to a maximum moisture content of 19% or less after treatment. All plywood shall be dried to a moisture content of 15% after treatment.
      b. The fire retardant chemicals used to treat the lumber were free of halogens, sulfates, ammonium phosphate and formaldehyde.
      c. The fire retardant treated wood does not require brush treatment of end cuts made in the field.
      d. The fire retardant treated wood has equilibrium moisture content of not more than 25% when tested in accordance with ASTM D3201 procedures at 95% relative humidity and 80° F.

B. Provide large-scale shop drawings, including plans, elevations, details of anchorage's, connections and accessory items, required for fabrication, installation and erection of all parts of the Work. Indicate location of both shop and field joints including provisions for controlling or adjusting joint tolerances for field conditions.

C. Take accurate field measurements before preparation of shop drawings and fabrication. No field cutting and fitting of factory finished millwork items, except standing and running trim, shall be allowed. Manufacturer shall indicate on his shop drawings all required field dimensions beyond his control. The Millwork Subcontractor and millwork manufacturer shall cooperate to establish and maintain these field conditions.

D. Submit at least two fully finished representative samples of each material that is to be exposed in the finished Work, showing the full range of color and finish variations expected. Provide samples having minimum area of 144 square inches.

E. Submit the approved manufacturer's written certification demonstrating compliance with environmental material requirements in accordance with requirements of the Contract Documents.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products only after wet Work has been completed and environmental conditions similar to those of the finished Work are established and maintained. Store and handle Work to prevent deterioration and damage. Comply with the approved manufacturer’s and AWI standards and recommendations.

1.07 PROJECT CONDITIONS

A. Maintain optimum environmental conditions to prevent woodwork from shrinkage, swelling and all other forms of damage. Millwork installer shall be aware of environmental conditions of the building and shall install his Work to conform to normal moisture conditions and wear and tear within the building.
1.08 WARRANTY

A. All architectural woodwork shall be guaranteed by the woodwork manufacturer/installer to be of good material and workmanship and free from defects that render it unserviceable for the use for which it is intended. Natural variations in color or texture of the wood are not considered defects. The quality of architectural woodwork shall be safeguarded while in the possession of the Millwork Subcontractor and shall not be stored in damp warehouses or placed in moist or freshly plastered buildings. The woodwork shall not be subjected to abnormal heat or dryness. Permanent heat and air-conditioning must be in operation a sufficient length of time to cure the building before any woodwork or doors are delivered to the site. Woodwork shall be guaranteed for a period of one year from date of Substantial Completion to repair or replace without charge any woodwork which is defective. Defects shall include, but not be limited to, warping and twisting of panels or surfaces, delamination of veneers from back-up substrates, failure of hardware components associated with desk and cabinet units, and cracking, chipping or discoloring of finish systems.

1.09 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 - PRODUCTS

2.01 FIRE RETARDANT TREATMENT

A. Materials for interior applications shall be pressure impregnated with Dricon fire retardant chemicals in accordance with recommendations and quality control of Hickson Corporation or Architect approved equal.

2.02 PARTICLE BOARD

A. Provide medium density, 100% pre-consumer wood fiber particleboard, no added urea-formaldehyde free, industrial grade particleboard core, Skyblend as manufactured by Roseburg Forest Products, or Architect approved equal, for all plastic laminate Work. Particleboard shall comply with requirements of ANSI A 208.1, Grade M 2.

1. Particleboard shall provide the following minimum performance properties, in accordance with requirements of ASTM D 1037:
   a. Density: 47 lbs./ft³
   b. Thickness: 3/4 in.
   c. MOR: 2,100 psi
   d. MOE: 326,300 psi
   e. Hardness: 500 psi
   f. Face Screw Holding: 225 lbs
   g. Edge Screw Holding: 200 lbs

2.03 MEDIUM DENSITY FIBERBOARD

A. Provide medium density fiberboard, 92% pre-consumer, no added urea-formaldehyde, Arreis as manufactured by Roseburg Forest Products, or Architect approved equal. Fiberboard shall comply with requirements of ANSI A 208.2, Grade 130.

1. Fiberboard shall provide the following minimum performance properties, in accordance with requirements of ASTM D 1037:
   a. Density: 47 lbs./ft³
   b. Thickness: 3/4 in.
   c. MOR: 3,800 psi
   d. MOE: 450,000 psi
   e. Hardness: 950 psi
2.04 PLASTIC LAMINATE COUNTERTOPS

A. Plastic laminate countertops, side splashes and backsplashes as called for on the Drawings shall be Premium Grade materials and workmanship in accordance with AWI Section 400 requirements.

B. Provide laminate complying with NEMA LD-3, fire-rated type, GP50, as manufactured by Wilsonart, Pionite, Formica, or Architect approved equal.

C. Plastic laminate shall be General Purpose, grade 10/HGS or Architect approved equal. Laminate color, texture, and pattern shall be as selected by the Architect from the approved manufacturer's complete line of standard and premium selections.

D. Particleboard core shall be medium density in accordance with requirements of Paragraph 2.02 above.

E. Strictly comply with the approved manufacturer's written fabrication instructions. Use joint adhesives and sealants as provided or recommended by the approved manufacturer for use in wet environments. Finish all exposed to view edges to match surface finish. All concealed surfaces of core shall be provided with permalam thermoset balance laminate sheet.

F. Prepare countertops, side splashes, and backsplashes for installation of electrical, communication and technology Work. Trim cut edges of all openings so that all core materials are covered with laminate. Provide 2 in. diameter holes and plastic cable grommets with adjustable closing covers in all countertops at 2 ft. O.C., or as otherwise called for on the Drawings.

G. Fabricate countertops to have the fewest possible seams. Seams shall be at a min of 8 ft. apart and the location of seams shall be shown on shop drawings for approval by the Architect. No seams shall be closer to a sink than 2 ft. Do not use any exposed fasteners or connectors. Use concealed bolts to hold seams and joints hairline and lightproof tight.

2.05 COUNTERTOP BRACKETS

A. Provide heavy duty steel countertop support bracket designed to support 1,000 lb. concentrated load, Model No. 46269, as manufactured by Rockler Hardware, or Architect approved equal by Knape & Vogt or Amerock. Brackets shall be 15 in. x 21 in., fabricated from .118 in. thick bent steel plate with countersunk, pre-drilled 1-1/2 in. wide top and wall flanges and all edges ground smooth. Bracket shall be factory painted white and be complete with molded cap inserts at wall and countertop fastener holes.

2.06 FIXED WOOD BENCH

A. Bench shall be built with Premium Grade materials in accordance with requirements of AWI Section 1700. Shop finishing shall conform to AWI 1500 Series, Premium Grade, for closed grained woods and to match Architects approved samples.

B. Bench panels shall be 3/4 in. plywood with white maple (Clear Finish WD1) veneer. Panel grain shall run vertically, matching, and shall comply with the following, in accordance with AWI Section 500 requirements.

1. Individual panels shall be center balance matched
2. Adjacent panels shall be book matched horizontally
3. Adjacent panels shall be butt matched vertically

C. Bullnose edge shall be 1 1/2 in. solid white maple (WD1) with 3/4 in. solid white maple (WD1) trims and aprons. See Drawings for profile and configurations.
2.07 PRIMING
   A. Work of this Section which has the back side concealed shall be back primed. Primer shall be alkyd pigmented material Cabot Stain Problem Solver Primer 8011 (white) or 8044 (grey) or Benjamin Moore, Moorewood Exterior Primer 094 (white) or a tinted sealer as recommended by the millwork fabricator.

2.10 FINISHING
   A. Shop Finishing: Provide Premium Grade materials and workmanship in accordance with AWI Section 1500 Factory Finishing requirements.
   B. Field Finishing: Transparent finish Work shall be touched up in the field by the installer required to match shop finishing approved by the Architect.
   C. Field Finishing Opaque Work: Opaque Work shall be field finished in accordance with requirements of Section 09 91 13 - Painting.

PART 3 - EXECUTION

3.01 INSPECTION
   A. The Contractor shall examine substrates, supports, and conditions under which this Work is to be performed and notify Architect, in writing, of conditions detrimental to the proper completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected. Beginning of installation Work means Installer's acceptance of substrates and conditions.

3.02 INSTALLATION
   A. Strictly comply with referenced standards. Make sure Work is back primed before Work is installed.
      1. Provide Work to sizes, shapes, and profiles indicated on approved shop drawings.
      2. Install Work to comply with quality standards and tolerances specified for shop Work.
      3. Install Work plumb and level and in perfect alignment.
      4. Install in longest practical lengths to minimize joints and seams. (Window stools to be one piece only)
      5. Located visible joints and seams only where approved by Architect.
      6. Scribe and fit Work neatly and accurately with hairline tight joints in transparent Work.
      7. Joints in painted Work shall be invisible after painting.
      8. Provide long scarf joints in running Work.
      9. Mitre and cope joints and seams.
     10. Color match wood at joints and seams to minimize expression of joints and seams in transparent finished Work.
     11. Secure counter support brackets to concealed blocking in walls to withstand loading specified. Allow for 1/2 in. shim and leveling space above brackets and below underside of countertops.
   B. Securely anchor Work to substrates, blocking and grounds with concealed fasteners.

3.03 REPAIRING AND PROTECTION
   A. Repair minor damage to eliminate all evidence of repair. Remove and replace Work which cannot be satisfactorily repaired.
   B. Provide temporary protection to ensure Work being without damage or deterioration at time of final acceptance. Remove protections and re-clean as necessary immediately before final acceptance.
3.04 RUBBISH REMOVAL

A. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION
PART 1 - GENERAL

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

1.02 DESCRIPTION OF WORK
A. The Work of this Section shall include, but not be limited to, furnishing and installation of the following:
   1. Rigid insulation below concrete slabs on grade
   2. Rigid insulation at perimeter footings and foundations
   3. Construction adhesives

1.03 RELATED WORK SPECIFIED ELSEWHERE
A. Carefully examine all the Contract Documents for requirements which effect the Work of this Section.
B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
   2. Section 02 41 13 – Selective Demolition
   3. DIVISION 03 – CONCRETE; including all Sections contained therein
   4. Section 04 21 11 – Reinforced Unit Masonry
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
   7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
   8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
   9. DIVISION 09 – FINISHES; including all Sections contained therein.
   10. Section 21 00 00 – Fire Suppression
   11. Section 22 00 00 – Plumbing
   12. Section 23 00 00 - HVAC
   13. Section 26 00 00 – Electrical
   14. DIVISION 31 – EARTHWORK; including all Sections contained therein
   15. Section 32 12 00 – Site Improvements

1.04 QUALITY ASSURANCE
A. Use adequate numbers of skilled Workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.
B. Provide products which meet or exceed flammability ratings indicated and required by authorities having jurisdiction.
C. Where material thickness is indicated, they are related to the K-values or R-values specified. Provide additional thickness, if necessary, to obtain the same level of performance with acceptable substitute materials which have different values of thermal conductivity. Where R-values are indicated, provide thickness required to achieve value specified.
1.05 SUBMITTALS
A. Submit the following product data:
   1. Materials list of items proposed to be provided under this Section
   2. Manufacturers' specifications and other data needed to demonstrate compliance with the specified requirements.
   3. Certified test reports for performance required.
B. Furnish a 1 ft. x 1 ft. sample of each type of insulation specified, labeled with manufacturer's name, thickness and location of use.

1.06 PRODUCT HANDLING
A. Provide all means necessary to protect the materials of this Section before, during, and after installation and to protect installed Work and materials of all other trades.
B. Repair and replacement of damage to the Work of this Section, as determined by the Architect, shall be completed immediately at no additional cost to the Owner.

1.07 PRE-INSTALLATION MEETING
A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 - PRODUCTS

2.01 RIGID INSULATION
A. At concrete foundations and below concrete slabs-on-grade, provide rigid, closed-cell, extruded polystyrene, Styrofoam SM, as manufactured by Dow Chemical, Green Guard by Pactiv Corporation, or Architect approved equal by Owens Corning, complying with ASTM C 578, with integral high-density skin, and the following properties and characteristics:
   1. Thermal Resistance at 75°F mean temperature: 5 per inch, in accordance with ASTM C 518
   2. Compressive Strength: 25 psi min.; in accordance with ASTM D 1621
   3. Water Absorption: Less than 0.1% by volume; in accordance with ASTM C 272
   4. Water Vapor Permeability: Maximum 1.1 perm-inch; in accordance with ASTM E 96
   5. Flexural Strength: 50 psi, in accordance with ASTM C 203
   6. Edges: Square for below grade applications
   7. Water Affinity: Hydrophobic
   8. Water Capillarity: None
   9. Thickness: 2 in. minimum
   10. Size: Provide the largest sheets possible, to minimize seams.
   11. Recycled Content: 18% Pre-Consumer, 40% Post-Consumer

2.02 CONSTRUCTION ADHESIVES
A. Provide rubber based, solvent dispersed, adhesive designed for bonding extruded polystyrene to construction materials, Styrofoam Construction Adhesive, as manufactured by Dow Chemical Company or Architect approved equal.
PART 3 - EXECUTION

3.01 INSPECTION
   A. The Insulation Subcontractor shall examine substrates, supports, and conditions under which this Work is to be performed and notify General Contractor, in writing, of conditions detrimental to the proper completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected. Beginning Work means Installer accepts substrates and conditions.

3.02 INSTALLATION
   A. Strictly comply with manufacturer’s instructions and recommendations, except where more restrictive requirements are specified in this Section. Install insulation between all heated and unheated spaces.
      1. Clean substrates and remove projections which could puncture vapor barriers.
      2. Extend insulation over entire area indicated to be insulated.
      3. Fit tightly around penetrations and obstructions. Fill all holes, gaps and voids.
      4. Do not over compress insulation.
      5. Provide insulation in one layer with tightly butted edges, unless indicated otherwise.
   B. Rigid board insulation at foundation walls and beneath concrete slabs on grade shall be adhered to clean substrate with spot application of adhesive or mastic approved by insulation manufacturer. Extend insulation over the area shown, or if not shown, as follows:
      1. Vertically: Down at least 4 ft. below finish grade to below the frost depth.
      2. Horizontally: Beneath slabs on grade continuously under entire slab.

3.03 PROTECTION
   A. Provide temporary protection to ensure Work being without damage or deterioration from weather or physical abuse. Repair and replacement of damage to the Work of this Section, as determined by the Architect, shall be completed immediately at no additional cost to the Owner.

3.04 RUBBISH REMOVAL
   A. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION
SECTION 07 25 00
WEATHER BARRIERS

PART 1 - GENERAL

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

1.02 DESCRIPTION OF WORK
A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:
   1. Vapor Barrier below concrete slabs-on-grade
   2. Dampproofing at vertical foundation walls
   3. Protection of completed Work

1.03 RELATED WORK SPECIFIED ELSEWHERE
A. Carefully examine all of the Contracts Documents for requirements which effect the Work of this Section.
B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
   2. Section 02 41 13 – Selective Demolition
   3. DIVISION 03 – CONCRETE; including all Sections contained therein
   4. DIVISION 04 - MASONRY; including all Sections contained therein
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
   7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
   8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
   9. DIVISION 09 – FINISHES; including all Sections contained therein.
   10. Section 21 00 00 – Fire Suppression
   11. Section 22 00 00 – Plumbing
   12. Section 23 00 00 - HVAC
   13. Section 26 00 00 – Electrical
   14. DIVISION 31 – EARTHWORK; including all Sections contained therein
   15. Section 32 12 00 – Site Improvements

1.04 QUALITY ASSURANCE
A. The Work of this Section shall be performed by manufacturer approved applicators having a minimum of five (5) years application experience with the required materials.
B. For each type of material required for the Work of this Section, provide primary materials which are the products of one manufacturer. Provide secondary materials which are acceptable to the manufacturers of the primary materials.
C. Make all arrangements and payments necessary to have the approved manufacturer’s authorized representative on-site at beginning of waterproofing to advise installer and to ensure compliance with manufacturer’s requirements.
D. Provide materials suitable for the intended use and compatible with the materials with which they shall be in contact. Compatibility of sealants and accessories shall be verified in writing by the approved manufacturer.
1.05 SUBMITTALS
A. Submit manufacturer's product data, installation instructions, use limitations and recommendations for each material and system required by the Work this Section.
   1. Prior to ordering vapor barrier materials, the Vapor Barrier Subcontractor shall submit the items listed below to the Architect for approval:
      a. 3 copies of manufacturer's specifications for proposed products and installation instructions.
      b. Written approval of manufacturer's use of the products in the proposed system.
      c. Specimen copy of vapor barrier manufacturer's warranty.
      d. Dimensioned shop drawings indicating areas of Work, vapor barrier layout and profile details of flashing methods for penetrations and terminations. It shall be the manufacturer's responsibility to verify compatibility with surrounding materials, especially at interface with other types of waterproofing.
B. Provide samples as follows:
   1. Submit representative samples of each control joint, sealant and expansion joint specified herein, showing the full range of color and finish variations expected. Provide actual samples having minimum length of 6 inches.
   2. Provide samples of each waterproofing material to be used in the systems described herein, including primers, mastics, tapes, liquid waterproofing, termination bars and fasteners, protection and drainage composite boards.
C. Provide certifications as follows:
   1. Provide manufacturer's certification of sealant and joint material performance, including compatibility with adjacent materials to which material shall be applied. Provide certified test reports on aged performances, hardness, stain resistance, adhesion, cohesion and tensile strength, low temperature flexibility, elongation, modules of elasticity, water absorption, and the resistance to weight loss and deterioration due to heat, ozone and ultraviolet exposure.

1.06 DELIVERY, STORAGE AND HANDLING
A. Deliver materials and products to the job site in original, unopened package, clearly labeled with the manufacturer's identification and printed instructions. All material shall be stored and handled in accordance with manufacturer's instructions and recommendations. Protect from damage

1.07 PROJECT CONDITIONS
A. Perform Work only when ambient conditions are within the limits established by manufacturers of the materials and products used.
B. Proceed with Work related to composite sheet waterproofing only when substrate construction and penetrating Work is complete and concrete or mortar has cured for at least 28 days.
C. Provide ventilation in accordance with the approved manufacturer's written requirements and recommendations throughout application and curing for all materials specified in this Section.

1.08 WARRANTY
A. Provide written warranty signed by the approved manufacturer for a period of 10 years from date of Substantial Completion and Installer warranty for a period of one (1) year for all materials provided under the Work of this Section.

1.09 PRE-INSTALLATION MEETING
A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.
B. Advise other trades to ensure that no other Work adversely effects sealer bonding surfaces.
PART 2 - PRODUCTS

2.01 VAPOR BARRIER
   A. Provide Class A, polyolefin vapor barrier, Stego Wrap, as manufactured by Stego Industries LLC, Perminator by W.R. Meadows, VaporBlock by Raven Industries, or Architect approved equal, complying with requirements of ASTM E 1745. Vapor barrier shall be manufactured using prime virgin resins and additives in a multi-layer extrusion process.
   B. Vapor Barrier shall comply with the following minimum performance characteristics:
      1. Permeance: 0.1 perms, ASTM F1249
      2. Puncture Resistance: 2,200 grams, ASTM D1709
      3. Tensile Strength: 45.0 lbf./in, ASTM D882
      4. Methane Transmission Rate: ASTM D1434
      5. Roll Dimensions: 14 ft. x 140 ft.
      6. Thickness: 15 mils
   C. Provide the approved manufacturer’s required accessories, including joint sealant tape, as required for a complete installation.

2.02 POLYURETHANE DAMPROOFING
   A. Provide spray applied, single component, polyurethane damproofing, 88R Aqua-Block Rubberized Damproofing, as manufactured by Karnak Corporation, or Architect approved equal by W.R. Meadows or Carlisle. The damproofing shall be Type 1, complying with requirements of ASTM D 4479, and the following material and performance characteristics:
      1. Weight per Gallon: 7.8 lbs./gal
      2. Solids by Weight +/- 2%: 57.3%
      3. Solids by Volume +/- 2%: 51.3%
      4. Color: Black
      5. Water Vapor Permeance: 0.0157 perms
      6. Air Permeability (Leakage): 0.001L/(s.m2) ASTM E-283
      7. Elongation: 550-600% ASTM D-412
      8. Tensile Strength: 150 PSI ASTM D-412
      9. Cure Time: 24 to 48 hours @ 77ºF and 50% RH
      10. Application: Spray or Brush
      11. Coverage: 4 gallons per 100 sq.ft.
      12. Service Temp (Cured Film): -40ºF to 160ºF
      13. Dry Film Thickness: 60 mils

PART 3 - EXECUTION

3.01 INSPECTION
   A. The Weather Barrier Subcontractor shall examine substrates, supports, and conditions under which the Work of this Section is to be performed and notify the General Contractor, in writing, of conditions detrimental to the proper completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected. Beginning Work means Installer accepts substrates and conditions.
   B. Strictly comply with the approved manufacturer’s written instructions and recommendations, except where more restrictive requirements are specified in this Section.

3.02 INSTALLATION
   A. Strictly comply with the approved manufacturer’s written instructions and recommendations, except where more restrictive requirements are specified in this Section.
B. Install vapor barrier in accordance with ASTM E1643.
   1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
   2. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise (a) at a point acceptable to the structural engineer or (b) where obstructed by impediments, such as dowels, waterstops, or any other site condition requiring early termination of the vapor barrier. At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself.
      a. Seal vapor barrier to the entire perimeter wall or footing/grade beam with double sided StegoTack Tape, or both Stego Term Bar and StegoTack Tape, per manufacturer's instructions. Ensure the concrete is clean and dry prior to adhering tape.
   1. Overlap joints 6 inches and seal with manufacturer's seam tape.
   2. Apply seam tape/Crete Claw to a clean and dry vapor barrier.
   3. Seal all penetrations (including pipes) per manufacturer's instructions.
   4. For interior forming applications, avoid the use of non-permanent stakes driven through vapor barrier. Use blunt-end and/or threaded nail stakes (screed pad posts) and insert them into Beast Foot. Ensure Beast Foot's peel-and-stick adhesive base is fully adhered to the vapor barrier.
   5. If non-permanent stakes must be driven through vapor retarder, repair as recommended by vapor retarder manufacturer.
   6. Use reinforcing bar supports with base sections that eliminate or minimize the potential for puncture of the vapor barrier.
   7. Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile.
   8. For vapor barrier-safe concrete screeding applications, install Beast Screed (vapor barrier-safe screed system) per manufacturer’s instructions prior to placing concrete.

3.03 REPAIR AND CLEANING
   A. Clean adjacent surfaces using materials and methods recommended by system manufacturer. Remove and replace Work that cannot be successfully cleaned.

3.04 RUBBISH REMOVAL
   A. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION
PART 1 - GENERAL

1.01 FILED SUB-BID REQUIREMENTS
   A. The Work of this Section is stipulated as a filed Sub-Bid under Paragraph D, Item 2 of the Form for General Bid.
   B. All Sub-bids shall be submitted on the Form for Sub-Bid, included as Section 00 00 20 of these Specifications, as required by Section 44F of Chapter 149 of the General Laws, as amended.
   C. The attention of Bidders is directed to Section 00 00 20 – City of New Bedford Front End Documents. Instructions to Bidders. Sub-Bids shall be filed with the Awarding Authority in accordance with requirements stipulated therein.
   D. The Work of the Filed Sub-Bid for Section 04 20 00 shall include the Work of the following Specification Section in its entirety:
      1. Section 07 62 00 – Sheet Metal Flashing and Trim
   E. The Trade Contractor for this Section shall examine all Drawings and all Sections of the Specification for requirements therein that may affect the Work of this Section, not just those Drawings and Specifications particular to the Work of this Section. The Work of this Section is shown primarily on the following listed Drawings

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

1.03 DESCRIPTION OF WORK
   A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:
      1. New mechanically attached induction welded PVC membrane roofing system including, but not limited to, the following:
         a. Overlayment board
         b. Flat and tapered rigid insulation
         c. Walkway pads
         d. Air barrier membrane
         e. Expansion joints, base flashing membranes, penetration boots
         f. Roof metal edge and fascia
         g. Sealants
      2. Perimeter metal blocking system
      3. Pressure treated and non-pressure treated plywood sheathing, eaves blocking for membrane securement, including all fasteners.
      4. Staging, scaffolding, hoists, and related equipment
   B. Items to Be Installed Only: Install the following items as furnished by the designated Sections:
      1. Section 23 00 00 - HVAC: Prefabricated equipment support curbs

1.04 RELATED WORK SPECIFIED ELSEWHERE
   A. Carefully examine all of the Contract Documents for requirements which affect the Work of this Section.
B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following Divisions:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
2. Section 02 41 13 – Selective Demolition
3. DIVISION 03 – CONCRETE; including all Sections contained therein
4. DIVISION 04 – MASONRY; including all Sections contained therein
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
9. DIVISION 09 – FINISHES; including all Sections contained therein.
10. Section 21 00 00 – Fire Suppression
11. Section 22 00 00 – Plumbing
12. Section 23 00 00 - HVAC
13. Section 26 00 00 – Electrical
14. DIVISION 31 – EARTHWORK; including all Sections contained therein\n15. Section 32 12 00 – Site Improvements

1.05 QUALITY ASSURANCE

A. Roofing system shall be applied by a Trade Contractor for this Section shall have a minimum 10 years of experience who has been approved and authorized prior to bid, by the approved roof membrane manufacturer.

B. All roof membrane system materials, components, insulation, and accessories shall be the products of a single manufacturer for compliance with requirements of the Contract Documents to provide twenty-five (25) year, full system warranty.

C. Upon completion of the installation, and at appropriate intervals during installation, an inspection shall be made by a representative of the manufacturer to ascertain that the roofing system has been installed according to applicable manufacturer's specifications and details.

1.06 PERFORMANCE REQUIREMENTS

A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing membrane manufacturer based on testing and field experience.

C. Roofing System Design: Provide a membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE 7-10.

1. Field-of-Roof Uplift Pressure: 51 psf.
2. Perimeter Uplift Pressure: 76 psf.

D. FMG Listing: Provide roofing membrane, base flashings, and component materials that comply with requirements in FMG 4450 and FMG 4470 as part of a membrane roofing system and that are listed in FMG’s "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.

1. Fire/Windstorm Classification: Class 1A-60.
2. Hail Resistance: MH.

E. Underwriters Laboratories

1. Class A Assembly Rating: UL 1256; Insulated Metal Deck Construction Assemblies – No. 120, 123, 292; UL 790; UL 263 Hourly Rated P Series Roof Assemblies.
1.07 SUBMITTALS

A. Certificates:
   1. Submit certified manufacturer documentation of acceptance of roof membrane system installer.
   2. Written certification by the approved manufacturer of roofing and insulation materials that all materials supplied comply with all requirements of the appropriate ASTM Standards, and that all the materials are suitable for the specified roofing system. Certification shall be provided in time to prevent delay in implementation of the Work of this Section.
   3. Pressure Treated Wood: Submit certification by treating plant stating chemicals and process used, net amount of salts retained, and conformance with applicable standards.
   4. Pressure Treated Wood: Submit certification for water-borne preservative that moisture content was reduced to 19% maximum, after treatment.
   5. Preservative treatment for field cut surfaces of pressure treated blocking and sheathing shall contain 2% copper naphthenate complying with AWPA Standard M4. Material shall be Green No. 10, as manufactured by Cuprinol, or Architect approved equal by WM Barr or Behr.

B. Samples and Shop Drawings:
   1. Provide two samples, labeled, of all materials provided under the Work of this Section.
   2. Provide shop drawings to include, but not be limited to, the following:
      a. Outline of roofs and sizes, showing field, corners, and perimeters
      b. Insulation fastening pattern for fasteners and adhesives at field, corners, and perimeter
      c. Location and type of all penetrations
      d. Perimeter and penetration flashing details
      e. Rigid insulation manufacturer brand, thickness
      f. Tapered and flat rigid insulation layout
      g. Fastener manufacturer, brand and length
      h. Warranty type and period
      i. Technical acceptance from membrane manufacturer

C. Provide the manufacturer's most recent edition of material and performance specifications for all materials provided under the Work of this Section.

D. Provide three copies of membrane manufacturer's full system warranty, and three (3) copies of the applicators warranty.

1.08 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products in unopened factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from damage.

B. Handle all materials to avoid damage to materials and roof deck. Store rolled goods directed by manufacturer. Discard rolls which have been flattened, creased, or otherwise damaged. Bonding adhesive shall be stored at temperatures above 40°F.

C. All flammable materials shall be stored in a cool dry area away from sparks and open flames. Follow precautions outlined on containers or supplied by material manufacturer/supplier.

D. Do not allow materials or incomplete roofing Work to be exposed to moisture, anywhere, at any time, during transportation, storage, handling or installation. Use pallets and tarpaulins to cover all stored material, top to bottom. Secure tarpaulin.

1.09 PROJECT CONDITIONS

A. Perform Work only when existing and forecasted weather conditions are within the limits established by manufacturers of the materials and products used.

B. Only as much of the new roofing as can be made weather-tight each day including all flashing Work, shall be installed.
C. All Work shall be scheduled and executed without exposing the interior building areas to the effects of inclement weather. The existing building and its contents shall be protected against all risks.

D. The membrane manufacturer requires the owner's representative or Trade Contractor for this Section run pullout tests of fasteners to verify condition of deck/substrate and confirm pullout values.

E. All surfaces to receive new insulation, membrane or flashings shall be thoroughly dry. Should surface moisture occur, the Trade Contractor for this Section shall provide the necessary equipment to dry the surface prior to application.

F. Temporary water stops shall be installed at the end of each day's Work, and shall be removed before proceeding with the next day's Work. Waterstops shall be compatible with all materials and shall not emit dangerous or incompatible fumes. Provide waterstops for all roofing systems described in this specification per manufacturers recommendations.

G. The Trade Contractor for this Section shall provide all necessary protection and barriers to segregate the Work area and to prevent damage to adjacent areas. Plywood protection shall be provided for all new roofing areas which shall receive traffic during construction.

H. Prior to and during application, all dirt, debris and dust shall be removed from surfaces either by vacuuming, sweeping, blowing with compressed air and/or similar methods.

I. Membranes and accessories shall not be exposed to prolonged temperature in excess of 160° F.

J. Contaminants, such as grease, fats, oils and solvents, shall not be allowed to come into direct contact with the roofing membrane. Any unusual exposures shall be presented to the membrane manufacturer for assessment of any impact on the roofing membrane.

1.10 WARRANTY

A. Provide twenty-five year full system warranty, no cap, non-prorated, transferable, labor and material, manufacturer's warranty to the Owner by the approved roof membrane system manufacturer from the date of Final Completion. Warranty length:

B. The Roofing Subcontractor, as a condition precedent to final payment, shall execute his own written guarantee direct to the Owner, warranting all roofing, base flashing and sheet metal work to be weather and watertight for a period of two years after date of final completion on the Project. Any imperfections as a whole or in part, by reason of defective materials, workmanship or arrangement of the various parts shall be made good to the satisfaction of the Owner at the Trade Contractor's expense.

1.11 CUTTING AND CORING

A. All new Work that requires cutting and coring of existing floors, walls, and/or roof penetrations measuring 4-1/2 in. or less, shall be performed by the Subcontractor of aFiled Sub-Bid Section.

B. The General Contractor shall cut and core existing floors, walls, and/or roof penetrations for sizes not indicated by theFiled Sub-Bid sections.

1.12 SCAFFOLDING AND EQUIPMENT

A. Provide, maintain, and remove safe and adequate interior and exterior staging, scaffolding, hoists, and all other related equipment, necessary for proper and complete execution of the Work of this Section in accordance with requirements of the Contract Documents. Staging, scaffolding, hoists, and all other related equipment shall comply with all applicable Federal, State, and local regulations and codes.

B. Staging, scaffolding, hoists, and all other related equipment shall be maintained to complete the Work, and removed when no longer required.

1.13 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the Contractor, Architect, and related Subcontractors.
PART 2 - PRODUCTS

2.01 ROOF MEMBRANE SYSTEM

A. Mechanically attached induction-welded PVC membrane as indicated on the Drawings shall be Type II, Grade 1, thermoplastic PVC membrane with fiberglass reinforcement conforming with ASTM D 4434 (latest version), “Standard for Poly Vinyl Chloride Sheet Roofing”, S327 as manufactured by Sika Sarnafil, Inc., or Architect approved equal by Carlisle SynTec or Johns-Manville.

B. Minimum roof membrane requirements shall comply with the following physical material and performance characteristics:

<table>
<thead>
<tr>
<th>PARAMETERS</th>
<th>ASTM TEST METHOD</th>
<th>PHYSICAL PROPERTIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Reinforcing Material:</td>
<td></td>
<td>Fiberglass</td>
</tr>
<tr>
<td>2. Overall Thickness (mil):</td>
<td>D751</td>
<td>72</td>
</tr>
<tr>
<td>3. Thickness Over Scrim (mil):</td>
<td></td>
<td>36</td>
</tr>
<tr>
<td>4. Felt Weight (oz/yd²):</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>5. Tensile Strength, mi., psi, (Mpa)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Machine Direction (%):</td>
<td>D638</td>
<td>1625</td>
</tr>
<tr>
<td>b. Cross Direction (%):</td>
<td>D638</td>
<td>1575</td>
</tr>
<tr>
<td>6. Elongation of Break, min.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Machine Direction (%):</td>
<td></td>
<td>250</td>
</tr>
<tr>
<td>b. Cross Direction (%):</td>
<td></td>
<td>220</td>
</tr>
<tr>
<td>7. Seam Strength, min., (% of original):</td>
<td>D638</td>
<td>Pass</td>
</tr>
<tr>
<td>8. Retention of Properties After Heat Aging</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Tensile Strength, min. (% of original):</td>
<td>D638</td>
<td>Pass</td>
</tr>
<tr>
<td>b. Elongation, min., (% of original):</td>
<td>D638</td>
<td>Pass</td>
</tr>
<tr>
<td>10. Low Temperature Bend (-40° F):</td>
<td>D2136</td>
<td>Pass</td>
</tr>
<tr>
<td>11. Accelerated Weathering Test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Cracking (7x magnification):</td>
<td></td>
<td>None</td>
</tr>
<tr>
<td>b. Discoloration (by observation):</td>
<td></td>
<td>Negligible</td>
</tr>
<tr>
<td>c. Crazing (7x magnification):</td>
<td></td>
<td>None</td>
</tr>
<tr>
<td>12. Linear Dimensional Change (%):</td>
<td>D1204</td>
<td>-0.01</td>
</tr>
<tr>
<td>13. Weight Change After Immersion in Water (%):</td>
<td>D570</td>
<td>1.8</td>
</tr>
<tr>
<td>14. Static Puncture Resistance, 33 lbf</td>
<td>D5602</td>
<td>Pass</td>
</tr>
<tr>
<td>15. Dynamic Puncture Resistance, 7.3 ft-lbf</td>
<td>D5635</td>
<td>Pass</td>
</tr>
<tr>
<td>16. Color:</td>
<td></td>
<td>White; complying with the following performance characteristics:</td>
</tr>
<tr>
<td>a. Initial Reflectivity:</td>
<td></td>
<td>0.83</td>
</tr>
<tr>
<td>b. Initial Emissivity:</td>
<td></td>
<td>0.90</td>
</tr>
<tr>
<td>c. Solar Reflective Index (SRI):</td>
<td></td>
<td>104 (ENERGY STAR listed)</td>
</tr>
<tr>
<td>17. Recycled Content (10 ft. &amp; 5 ft. sheet only):</td>
<td></td>
<td>9% Pre-consumer / 1% Post-Consumer</td>
</tr>
<tr>
<td>18. Environmental Product Declaration No.:</td>
<td>EPD028</td>
<td></td>
</tr>
</tbody>
</table>

2.02 ROOF METAL EDGE

A. Provide PVC coated, heat-weldable sheet metal, cut to size and formed to shape, Sarnaclad as manufactured by Sika Sarnafil, or Architect approved equal.

<table>
<thead>
<tr>
<th>PARAMETERS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gauge:</td>
<td>24 gauge, G90 galvanized</td>
</tr>
<tr>
<td>2. Aluminum Finish:</td>
<td>Standard color as selected by the Architect from the roof manufacturer's color chart</td>
</tr>
<tr>
<td>5. Flashing Strip:</td>
<td>Hot-air welded Sarnafil flashing strip</td>
</tr>
</tbody>
</table>
2.03 PRE-FINISHED ALUMINUM FASCIA
   A. Provide pre-finished aluminum fascia with continuous metal hook strip. Fascia shall be formed into shapes as shown on the drawings.
      1. Gauge: 0.050 in. thick formed aluminum
      1. Aluminum Finish: Standard color Kynar 500 as selected by the Architect from the roof manufacturer’s color chart
      2. Length: Standard 10 ft.
      3. Metal Hook Strip: shall be continuous 22 gauge and fastened using galvanized annular ring nails.
   B. Color of aluminum sheet shall be as selected by the Architect from the approved manufacturer’s complete selection of standard and premium colors.

2.04 PERIMETER METAL BLOCKING SYSTEM
   A. Perimeter metal blocking shall have been tested to comply with ANSI/SPRI ES-1 roof edge standard, in accordance with the most current edition of the International Building Code. Blocking shall be two-piece assembly fabricated from 20 Ga. galvanized steel with pre-punched fastener holes, in configuration, sizes, and depths as indicated on the Drawings, and complete with 4 in. wide concealed splice plates.

2.05 WOOD BLOCKING AND PLYWOOD SHEATHING
   A. Provide wood blocking and plywood sheathing that is pressure treated to a level of 0.25 pounds per cubic foot of wood product, with waterborne CCA preservatives in accordance with requirements of AWPA Standard U1 and T1. Plywood shall be dried to a maximum moisture content of 19 percent after treatment.
      1. Provide non-pressure treated lumber at all locations where roof membrane and adhesive flashings are required to be directly adhered to the lumber surface.
   B. Provide APA trademarked, Exposure 1 Rated and non-rated plywood performance rated sheathing, 3/4 in. thick, with span rating for spans indicated. Use of particleboard, flakeboard, or oriented strand board (OSB), shall not be allowed. Sheathing shall be pressure treated to a level of 0.25 pounds per cubic foot of wood product, with waterborne CCA preservatives in accordance with requirements of AWPA Standard U1 and T1.
      1. Provide non-pressure treated plywood at all locations where roof membrane and adhesive flashings are required to be directly adhered to the plywood surface.
   C. Wood blocking and nailers shall be in profiles and sizes as indicated on the Drawings or as otherwise required by the approved roof membrane manufacturer. Blocking and nailers shall be installed at the perimeter of the entire roof and around all other roof projections and penetrations. Thickness of blocking and nailers shall be fabricated and installed to provide a smooth transition from blocking to adjacent insulation.
   D. Provide fasteners with G-90 hot dip galvanized coating, or fluoropolymer coating, at areas of high humidity, including roof blocking and sheathing. Fasteners for use with non-CCA pressure treated lumber, including ACQ Types B and D, CBA-A, and CA-B, shall be stainless steel.

2.06 INSULATION AND ACCESSORIES
   A. Roof insulation shall be Type II, Class 2, Grade 3 polyisocyanurate insulation, ASTM C 1289, as approved by the roof membrane manufacturer modified as follows:
      1. Facer: Coated glass.
      2. Board size: 4 ft x 8 ft.
      3. Thickness: Bottom layer 3 in., top later 2.5 in. Total thickness: 5.5 in.
      4. Density: 25 psi minimum
      5. Edges: Square
   B. Provide compatible tapered insulation to provide crickets and drain insulation sumps where shown on the Drawings. Tapered insulation slope shall be 1/2 in. per foot.
C. Insulation Fasteners:
   1. The fastening system shall be 3 in. metal plate with a polymer coating, Sarnadisc Rhinobond and #12 fastener, Sarnafastener as manufactured by Sika Sarnafil, or Architect approved equal. The metal plate is positioned on the surface of the insulation board. The fastener is set through the center of the metal plate and holds the insulation in place into the roof deck.
   2. Fasteners and fastening plates incorporated in roofing system shall conform to FM 4470 standard and DIN 50018 specification for corrosion resistance.

D. Membrane and Flashing Adhesives and Sealants:
   1. Membrane and flashing adhesive shall be VOC compliant as supplied by the approved roof membrane manufacturer for the required substrate. Application rates shall be in compliance with the approved manufacturer's recommendations for the intended substrate.
   2. Sealant shall be as supplied by the approved roof membrane manufacturer, with color to match the adjacent roof membrane.

E. Elastomeric Flashing:
   1. Base flashing shall be compatible with sheet membrane as supplied by the approved roof membrane manufacturer.
   2. Pipe seals and prefabricated flashing accessories shall be as supplied by the approved roof membrane manufacturer.
   3. Molded Pipe Flashing shall be as supplied by the approved roof membrane manufacturer.

F. Provide the following accessory products as manufactured by the approved membrane manufacturer:
   1. Provide all clips, cleats, straps, anchors and similar items necessary to properly complete the Work. Provide accessories that are compatible with sheet metal materials used and which are of sufficient size and gage to perform as intended.
   2. Provide the approved manufacturer's recommended roof expansion joints at all locations as indicated on the Drawings, or as otherwise required to comply with the approved roof system manufacturer's written warranty requirements.

G. Provide spray foam insulation to achieve R15 at exposed flutes of metal roof deck. See Architectural drawings for locations. The spray foam insulation shall be Class 1, Class A, ASTM E-84, K-13 as manufactured by International Cellulose Corporation, or Architect approved equal.

H. Overlayment Board and Adhesive:
   1. Coverboard shall be 5/8 in. thick, water and mold resistant, silicone treated gypsum sheathing, Dens Deck Prime, as provided by Sarnafil, or Architect approved equal by Georgia Pacific, complying with requirements of ASTM C 1177. Board dimensions shall be as follows:
      a. 4 ft x 4 ft boards when adhering board with low-rise foam adhesive.
   2. Overlayment board adhesives shall be low-rise foam urethane adhesive as manufactured by the approved roofing membrane manufacturer.

2.07 MISCELLANEOUS ACCESSORIES
A. Expansion Joint Assembly: 2 in. expansion joint with hot-air welded flashing strip, compatible foam rod tubing, Sarnadisc Rhinobond plates, Sarnafastener No. 21, and batt insulation.
B. Aluminum Tape: 2 in. wide pressure-sensitive aluminum tape used as a separation layer between small areas of asphalt contamination and the membrane and as a bond-breaker under the coverstrip at Sarnaclad joints.
C. Multi-Purpose Tape: High performance sealant tape used with metal flashings as a preventive measure against air and wind-blown moisture entry.
D. Seam Cleaner: Used on PVC membranes to clean the in the seam area only.
E. Peel Stop Perimeter Bar: Extruded 1/8 x 1 in. aluminum, low profile bar with predrilled holes on 6 in. centers used to attach to the roof deck or to walls/curbs at terminations, penetrations and at incline changes of the substrate.

F. Miscellaneous fasteners and anchors shall be of the same type as metal being secured. In general, all fasteners, anchors, nails, straps, shall be of zinc or cadmium plated steel, galvanized, or stainless steel. All fasteners and anchors shall have a minimum embedment of 1-1/4 inches and shall be approved for such use by the fastener manufacturer. Fasteners for attachment of metal to wood blocking shall be annular ring nails. Fasteners for attachment of metal to masonry shall be expansion type fasteners. All fasteners shall meet Factory Mutual Standard 4470 for corrosion resistance.
   1. Fasteners for attachment of pressure treated blocking shall be stainless steel.

2.08 WALKWAY PADS

A. Provide 39 in. wide thermoplastic rolled-out heat welded walkway, ASTM D751, Sarnatred-V as manufactured by Sika, or Architect approved equal. The walkway pads shall have the following material and performance characteristics:
   1. Overall Thickness: 0.096 in.
   2. Tensile Strength: 275 psi
   3. Elongation at Break: 15 lbf. min.
   4. Tearing Resistance: 50 lbf. min.
   5. Low Temperature Bend: Pass, ASTM D2136
   7. UV Resistance: 5,000 hrs., ASTM D2565
   8. Puncture Resistance: 54 lbs., ASTM 2065
   9. Recycled Content: 1% Post-Consumer, 9% Pre-Consumer

2.09 AIR BARRIER MEMBRANE

A. Air barrier membrane at roof assemblies shall be 10 mil air barrier membrane, Sarnavap-10 as manufactured by Sarnafil, or Architect approved equal. Air barrier membrane shall comply with requirements of 780 CMR, Commonwealth of Massachusetts Building Code, Chapter 13, Section 1304.3, Air Leakage, and the following material and performance characteristics:
   1. Tensile Strength: 3470 psi per ASTM D 882
   2. Elongation at Break: 1000% per ASTM D 882
   3. Yield Strength: 1595 psi per ASTM D 882
   4. Water Vapor Permeance: 0.019 perms per ASTM E 96
   5. Impact Strength: 1.87 lbs. per ASTM D 1709

B. Provide the approved roof membrane manufacturer’s recommended spray applied foam insulation for infill of exposed steel roof deck flutes perpendicular to the edge of roof penetrations.

PART 3 - EXECUTION

3.01 GENERAL

A. The Work of this Section shall include coordination of the installation as necessary to ensure each area is made watertight at the end of each Work period.

3.02 DECK PREPARATION

A. At new steel decks a proper substrate shall be provided to receive the membrane as a mechanically attached system.

B. The Trade Contractor for this Section shall inspect the roofing surface for defects, including but not limited to, proper anchorage for compliance with required wind uplift resistance ratings, excessive surface roughness, contaminated surfaces, and structurally unsound substrates that shall adversely affect the quality of Work. Do not proceed with application of roofing until defects are corrected, and the surfaces have been approved by a representative of the membrane manufacturer.
3.03 PERIMETER METAL EDGE INSTALLATION

A. Perimeter edge blocking system, including bottom and top sections and concealed splice plates at all joints shall be attached to metal deck with mechanical fasteners in accordance with the approved manufacturer’s written instructions.

B. Edge blocking system shall be filled with rigid roof insulation to fully fill the entire cavity as indicated on the Drawings.

C. Starting at the corners, install a closure strip at the end of the metal deck closing off the flutes and a finish strip parallel with the flutes providing a level surface for the EdgeBox blocking. Fasten bottom sections of the blocking to the metal deck using the provided fasteners leaving an 1/8 in. gap for expansion. Place a concealed splice plate at exposed ends of bottom section. Starting at the corners, place top section to fully join the top and bottom sections. Secure each end with the supplied fasteners into the counter sunk holes.

3.04 WOOD BLOCKING INSTALLATION FOR NON-PERIMETER AREAS

A. Wood blocking and nailers shall be installed using the approved roof membrane manufacturers non-corrosive fasteners, or as otherwise required to comply with F.M. 1-60 wind uplift resistance requirements. All blocking and nailers required to be anchored by bolts and/or screws shall be counter bored to allow the top of the bolt or screw head to be flush with, or slightly below, the top of the finished wood surface. Provide all required expansion sleeves and other anchorages necessary and required for compliance with requirements of the Contract Documents.

1. Perform pull-out test to field verify integrity of fasteners

B. Wood blocking and nailers shall be provided in accordance with the approved roof membrane manufacturers installation details, or as otherwise required to accommodate field conditions, approved by the Architect.

C. Provide non-pressure treated blocking and plywood at all locations where roof membrane is required to be directly adhered to the exposed wood surface. Coordinate areas to receive fully adhered membrane roofing to ensure the proper substrate material is used in accordance with the approved roof membrane manufacturer’s written recommendations, and the Contract Documents.

D. Refer to the Drawings for all conditions necessary to complete the Work. In the absence of Drawing details, blocking shall be provided in accordance with the approved roof membrane manufacturer’s written installation details, or as otherwise required to accommodate field conditions approved by the Architect.

E. Install plywood roof sheathing with the grain of the outer plies at right angles to supports. Stagger end joints and locate over the center lines of supports. Allow 1/6 in. spacing at panel ends and 1/8 in. at panel edges. Fasten panels to metal members with self-tapping screws and to wood members with wood screw nails spaced 6 in. on centers at bearings.

3.05 INSTALLATION OF AIR BARRIER MEMBRANE

A. Air barrier membrane shall be placed over metal deck and pulled tight in all directions to eliminate all wrinkles and air bubbles. All seams and penetrations shall be taped in accordance with the approved manufacturer’s written instructions, or as otherwise required to comply with requirements of the Contract Documents.

1. At locations where flutes of roof deck are exposed and perpendicular to roof edge and roof deck penetrations, flutes shall be filled solid with expanding foam sealant to eliminate air flow.

2. Seal all joints in air infiltration barrier and provide adhesives as recommended by the approved roof membrane manufacturer for securing air barrier membrane to steel deck prior to application of rigid insulation.
3. Air barrier membrane shall extend beyond all roof edges whatever distance necessary for connection of the roof air barrier membrane to the wall air barrier membrane. The Work of this Section shall be coordinated with the Work of Section 07 27 26 – Fluid Applied Membrane Air Barriers’ to provide a complete and fully functional air barrier system in accordance with requirements of 780 CMR, 9th Edition, Chapter 13, including Section 1304.3, Air Leakage, and the Contract Documents.

3.06 APPLICATION OF ROOF INSULATION

A. Verify all dimensions, drain heights and drain locations in the field prior to installation of the tapered insulation system.

B. Starting at low points lay flat and tapered insulation panels directly over the steel or concrete decks in strict accordance with the layout pattern indicated on the Architect approved shop drawings. Flat insulation panels shall be installed over the deck substrates in thickness as indicated on the Drawings. All flat and tapered insulation panels shall be butted snugly with no gaps greater than 1/4 in. Gaps greater than 1/4 in. shall be filled with the same material.
   1. Perform pull-out test to field verify integrity of fasteners.
   2. Mechanically attach insulation to structural deck with roof membrane approved fasteners and plates at a rate approved and tested by the roof membrane manufacturer to meet uplift pressures as defined in Part 1 of this Section.

C. Fill insulation shall be utilized in 2 in. increments as necessary to achieve the specified thickness and thermal values.

D. Install crickets where indicated on the Drawings

E. Provide 9 ft. - 4 in by 9 ft. - 4 in. insulation sumps where shown on Drawings using tapered roof insulation to ensure final membrane surface is flush and smooth, and does not restrict flow of water.

3.07 ROOF MEMBRANE INSTALLATION

A. The surface of the insulation shall be inspected prior to installation of roof membrane. The insulation surface shall be clean and dry and smooth without excess surface roughness, contaminated surfaces or unsound surfaces.
   1. Over the properly installed and prepared insulation surface, apply approved adhesive and membrane in strict accordance with membrane manufacturer's printed instructions. All sheets shall be overlapped a minimum of three inches or as otherwise required for compliance with specified and approved welding techniques.
      a. Roof membrane shall not be installed when the dewpoint temperature is within 5 degrees Fahrenheit of the ambient air temperature.
   2. Installer shall take steps to ensure all membrane installation including seams, joints, accessories, and welding are of the highest standard, uniform in appearance providing roof surface with a monolithic appearance.

B. Membrane Securement:
   1. Securement shall be provided at the perimeter of each roof level, roof section, curb, skylight, and all other roof penetrations, and at base of slope where slope or combined slopes exceed 2 in. in one horizontal foot.
   2. Bar fastenings shall be mechanically fastened into the appropriate structural substrate and secured to roofing membrane.
   3. All flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary membrane flashing shall be allowed without the prior written approval of the membrane manufacturer and Architect. Approval shall only be for specific locations on specific dates.

3.08 HOT-AIR WELDING OF SEAM LAPS

A. General
   1. All seams shall be hot-air welded. Seam overlaps should be 3 in. wide when automatic machine-welding and 4 in. wide when hand-welding, except for certain details.
   2. Weld coverstrips at all membrane seams that do not have a factory selvage edge such as butt joints and cut edges.
3. Welding equipment shall be provided by or approved by membrane manufacturer. All mechanics intending to use the equipment shall have successfully completed a training course provided by Sika Sarnafil Technical Representative prior to welding. Ensure welding equipment is functioning properly prior to using.

4. All membrane to be welded shall be clean and dry.

B. Hand-Welding

1. Hand-welded seams shall be completed in two stages. Hot-air welding equipment shall be allowed to warm up for at least one minute prior to welding.

2. Back edge of seam shall be welded with a narrow but continuous weld to prevent loss of hot air during final welding.

3. Insert nozzle into seam at a 45° angle to edge of membrane. Once proper welding temperature has been reached and membrane begins to “flow,” position hand roller perpendicular to nozzle and roll lightly. For straight seams, use 1-1/2 in. wide nozzle. For corners and compound connections, use 3/4 in. wide nozzle.

C. Machine Welding

1. Machine welded seams are achieved by the use of approved automatic welding equipment. When using this equipment, manufacturer’s instructions shall be followed and local codes for electric supply, grounding and over current protection observed. Dedicated circuit house power or a dedicated portable generator is recommended. No other equipment shall be operated off simultaneously the generator.

2. Metal tracks may be used over the deck membrane and under the machine welder to minimize or eliminate wrinkles.

D. Quality Control of Welded Seams

1. Applicator shall check all welded seams for continuity using a rounded screwdriver. Visible evidence that welding is proceeding correctly is smoke during the welding operation, shiny membrane surfaces, and an uninterrupted flow of dark grey material from the underside of the top membrane.

2. On-site evaluation of welded seams shall be made daily by the Applicator at locations directed by the Owner’s Representative or manufacturer’s representative.

3. 1 in. wide cross-section samples of welded seams shall be taken at least three times a day. Correct welds display failure from shearing of the membrane prior to separation of the weld.

4. Each test cut shall be patched by the Applicator at no additional cost to the Owner.

5. Apply roofing membrane with side laps shingled in such a manner that water runs over or parallel to lap. Do not allow roof membrane to “buck” water.

E. Seams: Clean seam areas, overlap roofing membrane, and hot-air weld side and end laps of roofing membrane according to manufacturer’s written instructions to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roofing membrane.

2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.

3. Repair tears, voids, and lapped seams in roofing membrane that do not meet requirements.

4. T-Joints (three-way overlaps): Wherever possible, the head lap shall extend under the field seam so that the T-joint patch only has to step down over one thickness of membrane. When welding a T-joint, the top edge of the second membrane layer shall be chamfered to create a smooth transition for the top membrane layer to conform to for positive welding. Chamfer the edge of the membrane using a hand-held chamfer tool supplied by the manufacturer. Provide T-joint patches at all T-joints.

F. Spread sealant over deck drain flange at roof drains and securely seal membrane in place with clamping ring.

3.10 PERIMETER PEEL STOP

A. Provide enhanced mechanical attachment of membrane perimeter with a 1/8 x 1 in. bar attached on 12 in. centers 3 ft. from roof perimeter. Gap bar ends 1 in. Wrap bar ends with PVC membrane prior to membrane stripping.
B. Provide PVC membrane stripping centered over bar. Heat-weld stripping to membrane roofing with minimum 3 in. wide weld.

3.11 WALKWAY INSTALLATION
A. Prior to walkway installation check all existing deck membrane seams that are to be covered. Re-weld any inconsistencies before installation.
B. Install walkway in locations indicated on Drawings. Install according to roofing system manufacturer’s written instructions. Adhere walkway to roof membrane and heat weld entire perimeter.
C. Use connecting clips for butting two walkway ends together. Use 5 clips to join butt ends and one clip every 2 ft. to connect adjacent parallel walkways. Secure each side of walkway to membrane roofing on 5 ft. centers with loops of PVC membrane welded to field sheet.

3.12 COMPLETION
A. All Trade Contractor for this Section and manufacturer warranties required under the Work of this Section shall be submitted for approval prior to final payment.

3.09 RUBBISH REMOVAL
A. The Subcontractor of a Filed Sub-Bid Section shall stock pile and drop all waste and debris daily to the floor.
B. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.
SECTION 07 62 00

SHEET METAL FLASHING AND TRIM
(Filed Sub-Bid Required)

PART 1 - GENERAL

1.01 FILED SUB-BID REQUIREMENTS

A. The Work of this Section shall be included as part of the Filed Sub-Bid for Section 07 54 19 – Polyvinyl-Chloride (PVC) Roofing, stipulated as a Filed Sub-Bid under Paragraph D, Item 2 of the Form for General Bid.

B. All Sub-bids shall be submitted on the Form for Sub-Bid, included as Section 00 00 20 of these Specifications, as required by Section 44F of Chapter 149 of the General Laws, as amended.

C. The attention of Bidders is directed to Section 00 00 20 – City of New Bedford Front End Documents. Instructions to Bidders. Sub-Bids shall be filed with the Awarding Authority in accordance with requirements stipulated therein.

D. The Trade Contractor for this Section shall examine all Drawings and all Sections of the Specification for requirements therein that may affect the Work of this Section, not just those Drawings and Specifications particular to the Work of this Section. The Work of this Section is shown primarily on the following listed Drawings

1.02 RELATED DOCUMENTS

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

1.03 DESCRIPTION OF WORK

A. The Work of this Section shall include, but not be limited to, furnishing and installation of the following:
   1. Formed aluminum valley flashing, step flashing, and counterflashing
   2. Formed aluminum gutter and downspout
   3. Pre-cast concrete splash block
   4. Pressure treated and non-pressure treated wood blocking and plywood sheathing, including all fasteners.
   5. All receivers, clips, cleats, and trim required for a complete installation
   6. Staging, scaffolding, hoists, and related equipment

1.04 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which effect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
   2. Section 02 41 13 – Selective Demolition
   3. DIVISION 03 – CONCRETE; including all Sections contained therein
   4. DIVISION 04 – MASONRY; including all Sections contained therein
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
   7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
   8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
   9. DIVISION 09 – FINISHES; including all Sections contained therein.
   10. Section 21 00 00 – Fire Suppression
   11. Section 22 00 00 – Plumbing
   12. Section 23 00 00 - HVAC
13. Section 26 00 00 – Electrical
14. DIVISION 31 – EARTHWORK; including all Sections contained therein
15. Section 32 12 00 – Site Improvements

1.05 SUBMITTALS
A. Submit manufacturer’s product data for each product indicated
B. Submit large scale shop drawings, including layouts, profiles, shapes, seams, dimensions, and details for fastening, joining, supporting, and anchoring sheet metal flashing and trim
C. Submit 12 in. square, or 12 in. long samples for each type of sheet metal flashing and trim

1.06 QUALITY ASSURANCE
A. The Work of this Section shall comply with requirements of SMACNA’s "Architectural Sheet Metal Manual", and conform to dimensions and profiles shown unless more stringent requirements are indicated.
B. Roof edge fascia system shall comply with requirements of ANSI/SPRI ES-1 Wind Design Standard.
C. Intake vented fascia system at eave must be designed to meet or exceed the required net free area per linear foot (nfa/lf) required to provide 100% airflow into vented nailbase system airspace.

1.07 CUTTING AND CORING
A. All new Work that requires cutting and coring of existing floors, walls, and/or roof penetrations measuring 4-1/2 in. or less, shall be performed by the Subcontractor of a Filed Sub-Bid Section.
B. The General Contractor shall cut and core existing floors, walls, and/or roof penetrations for sizes not indicated by the Filed Sub-Bid sections.

1.08 SCAFFOLDING AND EQUIPMENT
A. Provide, maintain, and remove safe and adequate interior and exterior staging, scaffolding, hoists, and all other related equipment, necessary for proper and complete execution of the Work of this Section in accordance with requirements of the Contract Documents. Staging, scaffolding, hoists, and all other related equipment shall comply with all applicable Federal, State, and local regulations and codes.
B. Staging, scaffolding, hoists, and all other related equipment shall be maintained to complete the Work, and removed when no longer required.

1.09 PRE-INSTALLATION MEETING
A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 - PRODUCTS

2.01 ALUMINUM SHEET METALS
A. Valley flashing, step-flashing, and counterflashing shall be .063 in., pre-finished aluminum sheet, ASTM B 209, Alloy 3003, 3004, 3105, or 5005, Temper suitable for forming and structural performance required, but not less than H14.
  1. Aluminum sheet shall be finished with the approved manufacturer's standard 3-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight, with a minimum total dry film thickness of 1.5 mil; complying with AAMA 2605.
2. Color of aluminum sheet shall be as selected by the Architect from the approved manufacturer's complete selection of standard and premium colors.

3. Step flashing, counterflashing, formed roof scuppers, and related accessories and fasteners shall be Type 304 stainless steel in sizes and configurations as indicated on the Drawings.

2.02 ALUMINUM GUTTER AND DOWNSPOUT SYSTEM

A. Provide pre-engineered, pre-finished, aluminum gutter system, Designer Series, Roman Profile, DSR 8, as manufactured by Southern Aluminum Finishing Company, or Architect approved equal by Hickman or Metal-Era, in profile as indicated on the Drawings. Gutter system, including liner and fascia shall be capable of being formed into radii as indicated on the Drawings, without visible evidence of wrinkling or oil-canning.

B. Gutter support bracket shall be 0.125 in. x 1 in. extruded aluminum, located at 30 in. on center, and fastened with two corrosion resistant screws.

C. Gutter liner shall be factory formed from .040 aluminum, in 10-foot lengths, tapered and notched to provide a minimum 1 in. telescoping lap joint, and pre-punched at 12 in. on center to provide for thermal movement and attachment to gutter support brackets.

D. Gutter snap on fascia shall be factory formed from .040 in. aluminum, in 10-foot lengths, with hemmed top and bottom edge. Fascia joints shall be provided with 3/8 in. expansion reveal and 6 in. concealed back up splice plate. Fascia finish shall be 50% Kynar, factory applied, baked-on organic finish, in accordance with requirements of AAMA 2604-98, Aluminum Association Designation AA-M12-C42-R1X, and the approved manufacturer. Color shall be as selected by the Architect from the approved manufacturer's complete selection of standard and premium colors.

E. Gutter straps shall be 0.125 in. x 1 in. extruded aluminum, located at 30 in. on center, and fastened to gutter liner upper edge with corrosion resistant rivets.

F. Downspouts shall be formed of extruded 0.125 in. aluminum in 4 in. x 6 in. rectangular profile, with integral sleeves for joints, as manufactured by Southern Aluminum Finishing Company, or Architect approved equal by Hickman or Metal-Era. Provide SMACNA Type C Hanger/Wall brackets with minimum 2 in. standoff from building. The wall and downspout brackets shall be fastened together and to the downspout. Provide the approved manufacturer’s rectangular/round transition from downspout to subsurface drainage system, or Architect approved equal, Model DS4 by McKinley. Downspout and bracket finish and color shall match aluminum gutter system.

2.03 PRE-CAST CONCRETE SPLASH BLOCK

A. Provide 12 in. x 30 in., 49 lbs., 4,000 to 6,000 psi, steel reinforced, pre-cast concrete splash blocks as manufactured by Modern Pre-Cast or Architect approved equal.

2.04 PRESSURE TREATED WOOD

A. Provide pressure treated wood blocking and sheathing that is pressure treated to a level of 0.25 pounds per cubic foot of wood product, with waterborne CCA preservatives in accordance with requirements of AWPA Standard U1 and T1. Pressure treated lumber shall be dried to a maximum moisture content of 15 percent after treatment.

1. Provide non-pressure treated lumber at all locations where roof membrane and adhesive flashings are required to be directly adhered to the lumber surface.

B. Provide APA trademarked, Exposure 1 Rated and non-rated plywood performance rated sheathing, 3/4 in. thick, with span rating for spans indicated. Use of particleboard, flakeboard, or oriented strand board (OSB), shall not be allowed. Sheathing shall be pressure treated to a level of 0.25 pounds per cubic foot of wood product, with waterborne CCA preservatives in accordance with requirements of AWPA Standard U1 and T1.

1. Provide non-pressure treated plywood at all locations where roof membrane and adhesive flashings are required to be directly adhered to the plywood surface.
C. Wood blocking and nailers shall be in profiles and sizes as indicated or required by the approved roof membrane manufacturer. Blocking and nailers shall be installed at the perimeter of the entire roof and around all other roof projections and penetrations. Thickness of blocking and nailers shall be fabricated to provide a smooth transition from blocking to adjacent insulation.

D. Provide fasteners with G-90 hot dip galvanized coating, or fluoroploymer coating, at areas of high humidity, including roof blocking and sheathing. Fasteners for use with non-CCA pressure treated lumber, including ACQ Types B and D, CBA-A, and CA-B, shall be stainless steel.

2.05 MISCELLANEOUS MATERIALS

A. Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items required for complete sheet metal flashing and trim installation.

B. Fasteners, including wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners shall be designed and installed to withstand specified design loads.

C. Butyl sealant shall comply with requirements of ASTM C 1311 for single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.

D. Bituminous coating shall be cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat.

2.06 FABRICATION, GENERAL

A. Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.

B. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.

1. Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.

C. Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.

D. Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

E. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.

F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal, and in thickness not less than that of metal being secured.

H. Formed counterflashing shall be two-piece stainless steel, 0.025 in. thick.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items necessary and required to complete sheet metal flashing and trim system.

1. Torch cutting of sheet metal flashing and trim is not permitted.

2. Saw cut existing masonry a minimum of 1 inch in depth or as otherwise required for installation of new base flashing and counter flashing.
3. Install new counter flashing in a continuous manner, anchored with lead wedges at 8 inches on center, minimum, overlapped and sealed in accordance with the Contract Documents.

B. Where dissimilar metals shall contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.

C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.

D. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and butyl sealant.

E. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
   1. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
   2. Extruded termination base plate shall be set in a full bed of sealant in accordance with requirements of Section 07 54 19 – Polyvinyl-Chloride (PVC) Roofing.

F. Seal joints with butyl sealant in a professional workmanlike manner to produce a clean, tight watertight construction.

G. Clean surfaces to be soldered, removing oils and foreign matter. Pre-tinned edges of sheets to be soldered to a width of 1-1/2 inches except where pre-tinned surface would show in finished Work. Pre-tinning is not required for lead-coated copper.

H. Provide non-pressure treated blocking and plywood at all locations in accordance with the approved manufacturers written requirements.

I. Refer to the Drawings for all conditions necessary to complete the Work. In the absence of drawing details, blocking and sheathing shall be provided in accordance with the approved flashing or pre-manufactured manufacturer’s written installation details, or as otherwise required to accommodate field conditions approved by the Architect.

3.02 RUBBISH REMOVAL

A. The Subcontractor of a Filed Sub-Bid Section shall stock pile and drop all waste and debris daily to the floor.

B. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.
SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

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

1.02 DESCRIPTION OF WORK
   A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:
      1. Exterior polyurethane sealant for perimeter wall openings, expansion, and control joints
      2. Interior acrylic latex sealant for perimeter wall openings, wall joints, control joints, and countertop joints
      3. Expanding foam sealants
      4. Joint fillers and sealers, including preparation, filling, sealing, and curing of joints at all exterior and interior locations, as described in Part 3 - Execution of this Section
      5. Backer rods
      6. Concealed sealants
      7. Protection of completed Work

1.03 RELATED WORK SPECIFIED ELSEWHERE
   A. Carefully examine all the Contracts Documents for requirements which affect the Work of this Section.
   B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
      1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
      2. Section 02 41 13 – Selective Demolition
      3. DIVISION 03 – CONCRETE; including all Sections contained therein
      4. DIVISION 04 - MASONRY; including all Sections contained therein
      5. DIVISION 05 – METALS; including all Sections contained therein.
      6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
      7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
      8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
      9. DIVISION 09 – FINISHES; including all Sections contained therein.
      10. Section 21 00 00 – Fire Suppression
      11. Section 22 00 00 – Plumbing
      12. Section 23 00 00 - HVAC
      13. Section 26 00 00 – Electrical
      14. DIVISION 31 – EARTHWORK; including all Sections contained therein
      15. Section 32 12 00 – Site Improvements

1.04 QUALITY ASSURANCE
   A. The Work of this Section shall be performed by manufacturer approved applicators having a minimum of five (5) years application experience with the required materials.
   B. For each type of material required for the Work of this Section, provide primary materials which are the products of one manufacturer. Provide secondary materials which are acceptable to the manufacturers of the primary materials.
   C. Make all arrangements and payments necessary to have the approved manufacturer's authorized representative on-site at beginning of waterproofing to advise installer and to ensure compliance with manufacturer's requirements.
D. Provide materials suitable for the intended use and compatible with the materials with which they shall be in contact. Compatibility of sealants and accessories shall be verified in writing by the approved manufacturer.

E. Provide products and materials tested and certified for low emissions of volatile organic compounds (VOC), in accordance with requirements of the Contract Documents. Testing and certification shall comply with requirements of the following:

1. All paints and architectural coatings totaling 90% or more of the total volumes of such products applied in the project’s interior shall meet the VOC content requirements in the applicable category of South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings (amended July 2007 or current version).

2. All adhesives and sealants shall meet the VOC content requirements in the applicable category of South Coast Air Quality Management District (SCAQMD) Rule 1168, Adhesive and Sealant Applications (amended January 2005, or current version).

1.05 SUBMITTALS

A. Submit manufacturer’s product data, installation instructions, use limitations and recommendations for each material and system required by the Work this Section.

1. Prior to ordering waterproofing materials, the Waterproofing Subcontractor for this Section shall submit the items listed below to the Architect for approval:

   a. 3 copies of manufacturer’s specifications for proposed products and installation instructions.
   b. Written approval of manufacturers use of the products in the proposed system.
   c. Specimen copy of membrane manufacturer’s warranty.
   d. Dimensioned shop drawings indicating areas of Work, membrane layout and profile details of flashing methods for penetrations and terminations. It shall be the manufacturer’s responsibility to verify compatibility with surrounding materials, especially at interface with other types of waterproofing.

B. Provide samples as follows:

   1. Submit representative samples of each control joint, sealant and expansion joint specified herein, showing the full range of color and finish variations expected. Provide actual samples having minimum length of 6 inches.

   2. Provide samples of each waterproofing material to be used in the systems described herein, including primers, mastics, tapes, liquid waterproofing, termination bars and fasteners, protection and drainage composite boards.

C. Provide certifications as follows:

   1. Provide manufacturer’s certification of sealant and joint material performance, including compatibility with adjacent materials to which material shall be applied. Provide certified test reports on aged performances, hardness, stain resistance, adhesion, cohesion and tensile strength, low temperature flexibility, elongation, modules of elasticity, water absorption, and the resistance to weight loss and deterioration due to heat, ozone and ultraviolet exposure.

1.06 TESTS

A. Submit samples of every material to be used in the Work including, but not limited to, glass, gaskets, glazing materials, framing members, and all other components such as precast concrete, brick, concrete block, and other adjoining materials, and accessories, to glazing sealant manufacturer to verify sealant compatibility and to determine, by testing in accordance with requirements of ASTM C794, if primers and what type of primers are required to ensure adhesion to substrates.

   1. Submit at least 6 pieces of each type, class, kind, condition, and form of glass including monolithic, laminated, coated and insulated glass for adhesion testing. Provide 6 pieces of each type of brick, precast concrete, concrete block, and other adjoining materials for adhesion and staining testing.

   2. Schedule sufficient time for testing, analysis and reporting of results, understanding that long lead times are required by the sealant manufacturer.

   3. Obtain manufacturer’s written report and recommendations regarding proper sealant choice and use. Use sealants and substrates only in combinations for which favorable adhesion and compatibility results have been obtained.
4. Make all arrangements and pay all expenses related to these tests.

B. Periodically test sealants in place for adhesion using methods recommended by sealant manufacturer. Promptly replace all sealant which does not adhere or which fails to cure properly.

C. If manufacturers cannot or shall not perform these tests, employ at the expense of the Waterproofing Subcontractor for this Section an independent testing agency acceptable to the Architect to perform tests and certifications indicated.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products to the job site in original, unopened package, clearly labeled with the manufacturer’s identification and printed instructions. All material shall be stored and handled in accordance with manufacturer’s instructions and recommendations. Protect from damage.

1.08 PROJECT CONDITIONS

A. Perform Work only when ambient conditions are within the limits established by manufacturers of the materials and products used.

B. Proceed with Work related to composite sheet waterproofing only when substrate construction and penetrating Work is complete and concrete or mortar has cured for at least 28 days.

C. Provide ventilation in accordance with the approved manufacturer’s written requirements and recommendations throughout application and curing for all materials specified in this Section.

1.09 WARRANTY

A. Provide written warranty signed by manufacturer, agreeing to repair or replace Work which exhibits defects in materials or Workmanship. "Defects" shall include, but not be limited to, leakage of water, abnormal aging or deterioration, and failure to perform in accordance with requirements of the Contract Documents. Include requirement for removal and replacement of covering and connected adjacent Work. Warranty periods shall be as follows:

1. Sealants and Crack Control Materials: 5 years from date of Substantial Completion
2. Waterproofing: 10 years from date of Substantial Completion
3. Exterior sealants: 20 years from date of Substantial Completion

1.10 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

B. Advise other trades to ensure that no other Work adversely effects sealer bonding surfaces.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Each sealant shall be checked for adhesion and compatibility with all adjacent materials. Select a sealant that is recommended by the approved manufacturer for the specified application.

B. Color of each sealant shall be as selected by the Architect from the approved manufacturer’s complete selection of standard and premium colors.

2.02 EXTERIOR SEALANT

A. Provide single-component, non-sag, moisture-cure, polyurethane sealant, Dymonic 100, as manufactured by Tremco, or Architect approved equal by Pecora or Dow Corning. Polyurethane sealant is for exterior caulking of perimeter wall openings, expansion and control joints. Polyurethane sealant shall comply with the following requirements:
1. Color: As selected by Architect from Manufacturer’s standard and premium line of not less than 20 colors.
2. Solids: 98%
3. Application: gun-grade sealant, applied with typical caulking equipment
5. Movement Capability: +/- 50%, ASTM C719
6. Tensile Strength: 350 to 450 psi, ASTM D412
7. % Elongation: 800 to 900%, ASTM D412
8. Modulus at 100%: 75 to 85 psi, ASTM D412
9. Tear Strength: 65 to 75 psi, ASTM D412
10. Application Temperature: 40 to 100°F
11. Smoke Development: 5, ASTM E84
12. Fire Spread: 5, ASTM E84

2.03 INTERIOR SEALANT
A. Provide single component, non-sag, acrylic latex sealant, AC-20 + Silicone as manufactured by Pecora Corporation, or Architect approved equal by Dow Corning or Tremco. Acrylic latex sealant is for interior caulking of perimeter wall openings, wall joints, control joints, and countertop joints. Acrylic latex sealant shall comply with the following requirements:
1. Color: As selected by Architect from Manufacturer’s standard and premium line of not less than 20 colors.
2. Adhesion Loss: 0.5, ASTM C736
3. Elongation, Ultimate: 150%, ASTM D412
4. Extrudability: 9.8 g/sec, ASTM C731
5. Low-Temperature Flexibility: PASS, ASTM C734
6. 100% Modulus: 60-65 psi, ASTM D412
7. Recovery: 90%, ASTM C736
8. Slump: <0.05 in., ASTM D2202
10. VOC Content: 31 g/L, ASTM D3960

2.04 EXPANDING FOAM SEALANT
A. Provide self-expanding, open cell polyurethane foam sealant, impregnated with water based, stabilized, polymer modified acrylic, with internal laminations of closed cell (EVA) foam, and factory applied and cured silicone weather facing. Colorseal, as manufactured by Emseal, or Architect approved equal. The expanding foam sealant shall be applied to metal deck flutes at roof perimeter, interior vertical joints above grade, including but not limited to, building expansion and control joints. Impregnation agent shall be non-migratory and compatible with sealant at interface. Sealant width shall be determined by joint width, as required to provide +/- 25% of joint movement capacity. Sealant shall comply with the following material and performance characteristics:
1. Tensile Strength: 21 psi minimum, in accordance with requirements of ASTM D 3574
2. Durometer Hardness: Shore A, 15 points, in accordance with requirements of ASTM D 2240
3. Staining: None, in accordance with requirements of ASTM C 510
4. Primary Surface Weathering: Minimal after 6,000 hours, in accordance with requirements of ASTM G 26-77
5. Thermal Conductivity: .34 BTU in./hr. / ft², in accordance with requirements of ASTM C 518
6. Color: As selected by the Architect from the approved manufacturer’s complete selection of standard colors

2.05 MISCELLANEOUS MATERIALS
A. Provide appropriate surface primers and accessories for surfaces to be adhered to, in accordance with the approved manufacturer’s written requirements.
B. Provide bond breaker tape No. 40 or No. 531 (heavy duty), as manufactured by Valley Industrial Products, or Architect approved equal by Decker, in accordance with the approved manufacturer’s written requirements, appropriate for the sealant being used.

C. Provide backer rods compatible with the specified sealant, and as follows:
   1. Backer rod for all building joints shall be non-absorbing, with highly resistant interior network of closed and open cells, SOF ROD as manufactured by Applied Extrusion Technologies, or Architect approved equal.
   2. Backer rod for paving and floor joints shall be closed cell polyethylene rod extruded in continuous lengths, GREEN ROD as manufactured by NMC, or Architect approved equal.

D. Sealant shall be non-drying, non-hardening, non-bleeding, non-staining sealant complying with ASTM C 834 and C 919.

PART 3 - EXECUTION

3.01 INSPECTION

A. For each material the installer shall examine substrates, supports, and conditions under which this Work is to be performed and notify General Contractor, in writing, of conditions detrimental to the proper completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected. Beginning Work means Installer accepts substrates and conditions.

B. Strictly comply with the approved manufacturer’s written instructions and recommendations, except where more restrictive requirements are specified in this Section.

3.02 JOINT SEALANTS AND FILLERS

A. Clean joint surfaces immediately before installation of sealants, primers, tapes and fillers. Remove all substances which could interfere with bond. Prime, etch, or roughen joint surfaces as necessary to improve bond. Tape or mask adjoining surfaces to prevent spillage and migration problems. Provide backer rods for all liquid sealants except where specifically recommended against by sealant manufacturers. Prevent three-sided adhesion by use of bond breaker tapes or backer rods.

B. Force sealant into joints to provide uniform, dense, continuous ribbons free from gaps and air pockets. Install sealants so that compressed sealants do not protrude from joints. Dry tool sealants to form a smooth dense surface with joint surfaces adhering equally on opposite sides. At horizontal joints form a slight cove to prevent trapping water. Except in hot weather, make sealant surface slightly concave.
   1. Make sealant joint depth equal to joint width for joints up to 1/2 in. wide. For joints over 1/2 in. wide, make depth equal to one-half of the joint width. Joint depth at exterior silicone sealant shall not be greater than 1/2 in.
   2. Fill all joints solidly and continuously with a sealant, neatly applied with a standard caulking gun in a continuous motion, using slight pressure. "Push" the sealant bead ahead of the nozzle; do not "drag" the nozzle.
   3. Within 5 minutes of sealant application and before sealant skins over, dry tool the joint surface with a concave tool to insure intimate contact with substrate and to eliminate air bubbles. Do not use any liquid for tooling. Provide a smooth, uniform, finished surface.
   4. Avoid contaminating adjacent surfaces with excess sealant. Remove all traces of smears and droppings on metal, stone, glass, or other surfaces promptly, using a solvent recommended by the sealant manufacturer and that shall not damage or discolor the building surfaces. Remove smears and droppings on face surfaces by mechanical means after the initial cure of the sealant.
   5. Coordinate Work with other trades to prevent contamination of fresh sealant by dust or other debris. Do not seal over any epoxy placements which are not cured.
   6. Install internal wall joints so as to maintain connectivity between vertical and horizontal constructions. Extend internal sealant to the face of wall where indicated and as otherwise directed by Architect to compartmentalize waterproofing protection.
7. Install internal sealant materials at sufficient depth (2 1/2 in.+) to maintain 3/4 in. clear unobstructed cavity between finish face of internal sealant and back of external sealant backing material.

8. Internal joint integrity shall be equal to external joint integrity. Internal seals are primary seals to prevent internal building water intrusion.

C. Provide acoustical insulation and sealant to seal tightly and completely around all penetrating objects through non-fire rated gypsum drywall and masonry walls and concrete floors, including but not limited to, HVAC duct, fire protection piping, and electrical conduit penetrations, as indicated on the Drawings.

1. Provide a thin sheet metal sleeves at all penetrations through gypsum drywall construction to allow a minimum 3/4 in. wide gap between the penetrating object and adjacent gypsum drywall construction. Fit the sheet metal sleeve tightly to the surrounding drywall construction on all sides, or the entire perimeter, of the penetrating object. Pack the resulting 3/4 in. space between the sleeve and the penetrating object solidly with fibrous acoustical insulation. Provide resilient, non-hardening acoustical sealant to completely seal both sides of wall between the penetrating object and adjacent gypsum drywall construction.

2. At all penetrations through masonry walls wrap the penetrating object with 1 in. thick fibrous acoustic insulation and fill the space remaining between the acoustic insulation and masonry wall opening solid with cementitious grout prepared in accordance with Section 04 20 00 – Unit Masonry. Provide resilient, non-hardening acoustical sealant to completely seal both sides of wall between the penetrating object and adjacent masonry construction and grout infill.

3. Installation of acoustic insulation and sealant is not required at locations of penetrating objects through fire rated gypsum drywall and masonry walls.

D. Seal all interior and exterior joints, seams, intersections between dissimilar materials, unless specifically noted to be performed under the Work of other Sections.

1. The Work of this Section shall include, but not be limited to, sealing of the following exterior conditions:
   a. Building expansion and control joints
   b. Concrete to concrete at cold joints
   c. Vertical wall flashing terminations and reglets

2. The Work of this Section shall include, but not be limited to, sealing of the following interior conditions at new and existing building:
   a. Perimeter wall openings at H.M. door frames, H.M. security window frames, and overhead sectional door frames.
   b. All joints between gypsum drywall and dissimilar materials
   c. Backsplash to counter joints and backsplash to wall joints at countertops
   d. Completely around all plumbing fixtures, fittings, and trim to countertops, walls and floors
   e. At the perimeters of all backsplashes to wall, ends, and backsplash to counter whether a sink is present or not and all counter to wall areas with no backsplash.
   f. At all slab-on-grade construction joints, control joints, and column bases.

E. Cure sealants in strict compliance with the approved manufacturers’ instructions and recommendations to obtain highest quality surface and maximum adhesion. Make every effort to minimize accelerated aging effects and increase in modulus of elasticity.

3.03 REPAIR AND CLEANING

A. Remove and replace Work which is damaged or deteriorated in any respect.

B. Clean adjacent surfaces using materials and methods recommended by system manufacturer. Remove and replace Work that cannot be successfully cleaned.
3.04 RUBBISH REMOVAL

A. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION
PART 1 - GENERAL

1.01 RELATED DOCUMENTS
   A. All the Contract Documents, including Drawings, General and Supplementary Conditions and Division 1 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK
   A. The Work of this Section shall include, but not be limited to, provision and installation of the following:
      1. Expansion joints and expansion joint covers, complete in place, at locations as indicated on the Drawings, as specified herein, or otherwise needed for a complete and proper installation.

1.03 RELATED WORK SPECIFIED ELSEWHERE
   A. Carefully examine all the Contract Documents for requirements which effect the Work of this Section.
   B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
      1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
      2. Section 02 41 13 – Selective Demolition
      3. DIVISION 03 – CONCRETE; including all Sections contained therein
      4. Section 04 21 11 – Reinforced Unit Masonry
      5. DIVISION 05 – METALS; including all Sections contained therein.
      6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
      7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
      8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
      9. DIVISION 09 – FINISHES; including all Sections contained therein.
      10. Section 21 00 00 – Fire Suppression
      11. Section 22 00 00 – Plumbing
      12. Section 23 00 00 - HVAC
      13. Section 26 00 00 – Electrical
      14. DIVISION 31 – EARTHWORK; including all Sections contained therein
      15. Section 32 12 00 – Site Improvements

1.04 SUBMITTALS
   A. Shop Drawings: Provide the following for each joint system specified and obtain approval prior to fabrication and shipment of materials to the job site:
      1. Placement Drawings: Include line diagrams showing plans, elevations, sections, details, splices, blockout requirement, entire route of each joint system, and attachments to other work. Where joint systems change planes, provide isometric or clearly detailed drawing depicting how components interconnect.

   B. Product Data: Submit copies of manufacturer’s latest published literature for materials specified herein for approval, and obtain approval before materials are fabricated and delivered to the site. Data to clearly indicate movement capability of cover assemblies and suitability of material used in exterior seal for UV exposure.

   C. Samples for Initial Selection: For each type of joint system indicated.
      1. Include manufacturer’s color charts showing the standard range of colors and finishes available for each exposed metal and elastomeric seal material.
D. Certificates – Material test reports from qualified independent testing laboratory indicating and interpreting test results relative to compliance of fire-rated expansion joint assemblies with requirements indicated.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Approved by manufacturer and having experience installing joint systems that are similar in design complexity.

B. Source Limitations: Obtain all architectural joint systems through one source from a single manufacturer.

C. Product Options: Drawings indicate size, profiles, and dimensional requirements of architectural joint systems and are based on the specific systems indicated. Refer to Division 01 Section "Product Requirements."
   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

D. Loading Characteristics: Standard loading refers to covers that are capable of withstanding up to 500 lb. point loads. Heavy duty refers to covers that are capable of withstanding up to 2000 lb. point loads.

E. Fire-Test-Response Characteristics: Where indicated, provide architectural joint system and fire-barrier assemblies identical to those of assemblies tested for fire resistance per UL 2079 and/or ASTM E 1966 by a testing and inspecting agency acceptable to authorities having jurisdiction. Fire rating not less than the rating of adjacent construction.

F. Manufacturer to provide 5-year warranty for all joint covers.

1.06 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Provide products as manufactured by C/S Group, or Architect approved equal by Joint Master or Balco.

2.02 MATERIALS

   1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.
   3. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.
   4. Class II, Color Anodic Finish: AA-M12C22A32/A34 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, integrally colored or electrolytically deposited color coating 0.010 mm or thicker) complying with AAMA 611.
   5. High-Performance Organic Finish (Two-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2604 and with coating and resin manufacturers' written instructions.

B. Elastomeric Seals: Preformed elastomeric membranes or extrusions to be installed in metal frames.
C. Compression Seals: ASTM D2000; preformed rectangular elastomeric extrusions having internal baffle system and designed to function under compression.

D. Fire Barriers: Any material or material combination, when fire tested after cycling, designated to resist the passage of flame and hot gases through a movement joint and to meet performance criteria for required rating period.

E. Moisture Barrier: 7-ply laminate reinforced Polyethylene.

F. Accessories: Manufacturer's standard anchors, clips, fasteners, set screws, spacers, and other accessories compatible with material in contact, as indicated or required for complete installations.

2.03 EXPANSION JOINT ASSEMBLIES

A. General: Provide architectural joint systems of design, basic profile, materials, and operation indicated. While specified joint systems establish the function and aesthetic intent, it may be necessary for the manufacturer to modify the joint systems to accommodate the movement requirements as scheduled in the contract documents. Such modifications should be made without significant changes to the aesthetic or functional intent of the joint systems. Provide units with capability to accommodate variations in adjacent surfaces.

B. Design architectural joint systems for the following size and movement characteristics:
   1. Interior Floor-to-Floor: GFST-200, as manufactured by C/S Group, or Architect approved equal.
   2. Interior Wall-to-Wall: ASM-200, as manufactured by C/S Group, or Architect approved equal.
   3. Interior Wall-to-Wall at corner: ASMC-200, as manufactured by C/S Group, or Architect approved equal.
   4. Exterior Wall-to-Wall: VF-200, as manufactured by C/S Group, or Architect approved equal.

2.04 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
   1. Provide a strippable, temporary protective covering on exposed surfaces to protect mechanical finishes from damage by before shipping.

B. Aluminum:
   1. Class II, Clear Anodic Finish: AAMA 607.1

C. Factory bonded, smooth surface polyurethane expansion seal color shall be as selected by the Architect from the approved manufacturer's complete selection of standard and premium colors.

D. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

E. Appearance of Finished Work: Noticeable variations in same piece are not acceptable.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine surfaces and blockouts where architectural joint systems shall be installed for installation tolerances and other conditions affecting performance of work.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Prepare substrates according to architectural joint system manufacturer's written instructions.

B. Repair concrete slabs and blockouts using manufacturer's recommended repair grout of compressive strength adequate for anticipated structural loadings.
C. Coordinate and furnish anchorages, setting drawings, and instructions for installing joint systems. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of joint systems.

D. Cast-In Frames: Coordinate and furnish frames to be cast into concrete.

3.03 INSTALLATION

A. Comply with manufacturer's written instructions for storing, handling, and installing architectural joint assemblies and materials unless more stringent requirements are indicated.

B. Metal Frames: Perform cutting, drilling, and fitting required to install joint systems.
   1. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
   2. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation. Notify Architect where discrepancies occur that shall affect proper joint installation and performance.
   3. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
   4. Locate in continuous contact with adjacent surfaces.
   6. Heavy-Duty Systems: Repair or grout blockout required for continuous frame support and to bring frame to proper level. Shimming is not allowed.
   7. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.

C. Seals in Metal Frames: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
   1. Provide in continuous lengths for straight sections.
   2. Seal transitions according to manufacturer's written instructions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
   3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.

D. Compression Seals: Apply adhesive or lubricant adhesive as recommended by manufacturer before installing compression seals.

E. Terminate exposed ends of joint assemblies with field- or factory-fabricated termination devices.

F. Fire-Resistance-Rated Assemblies: Coordinate installation of architectural joint assembly materials and associated work so complete assemblies comply with assembly performance requirements.
   1. Fire Barriers: Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of joint, including transitions and field splices.

G. Water Barrier: Provide water barrier at exterior joints and where called for on Drawings. Provide drainage fittings where indicated.

3.04 PROTECTION

A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.

B. Protect the installation from damage by work of other Sections. Where necessary due to heavy construction traffic, remove and properly store cover plates or seals and install temporary protection over joints. Reinstall cover plates or seals prior to Substantial Completion of the Work.
3.05 RUBBISH REMOVAL

A. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION
PART 1 - GENERAL

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

1.02 DESCRIPTION OF WORK
   A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:
      1. Interior and exterior non-rated hollow metal doors and frames
      2. Interior borrowed light frames
      3. Sealant at perimeter of H.M. door frames in contact with other dissimilar materials
   B. Items to Be Installed Only: Install the following items as furnished by the designated Sections:
      1. Section 08 80 00 – Glazing: Clear Tempered and Forced Entry Glass

1.03 RELATED WORK SPECIFIED ELSEWHERE
   A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.
   B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
      1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
      2. Section 02 41 13 – Selective Demolition
      3. DIVISION 03 – CONCRETE; including all Sections contained therein
      4. DIVISION 04 – MASONRY; including all Sections contained therein
      5. DIVISION 05 – METALS; including all Sections contained therein.
      6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
      7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
      8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
      9. DIVISION 09 – FINISHES; including all Sections contained therein.
      10. Section 21 00 00 – Fire Suppression
       11. Section 22 00 00 – Plumbing
       12. Section 23 00 00 - HVAC
       13. Section 26 00 00 – Electrical
       14. DIVISION 31 – EARTHWORK; including all Sections contained therein
       15. Section 32 12 00 – Site Improvements

1.04 QUALITY ASSURANCE
   A. Provide products of one manufacturer for each type of door and frame required for the Work of this Section. Provide secondary materials and products which are acceptable to the door and frame manufacturers.
   B. Provide doors and frames that comply with Steel Door Institute SDI-100, Recommended Specifications for Standard Steel Doors and Frames. Install doors in strict compliance with the following as they apply:
         a. ASTM-A1008/A1008M-00 - Specification for Commercial Steel (CS) Sheet, Carbon, Cold-Rolled.
         b. ASTM B 117 - Standard Test Method of Salt Spray (Fog) Testing
         c. ASTM E 152 – Standard Method for Fire Tests of Door Assemblies
d. ASTM E 283 – Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen


g. ASTM A 653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process

h. ASTM A 924 – Standard Specification for General Requirements for Steel Sheet, Metallic Coated by the Hot-Dip Process

i. ASTM D 610 – Standard Test Method for Evaluating Degree of Rusting on Painted Steel Surfaces


a. ANSI/UL 10B Fire Tests of Door Assemblies

b. ANSI/NFPA 80 Fire Doors and Fire Windows

c. ANSI/NFPA 252 Fire Tests of Door Assemblies

d. ANSI A250.3 – Test Procedure and Acceptance Criteria for Factory Applied Finish Painted Steel Surfaces for Steel Doors and Frames

e. ANSI A250.4 – Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcing

f. ANSI A250.6 (SDI 107) – Hardware on Standard Steel Doors (Reinforcement-Aplication)

g. ANSI A250.7 – Nomenclature for Steel Doors and Steel Door Frames

h. ANSI A250.8 (SDI-100) – Recommended Specifications for Steel Doors & Frames

i. ANSI A250.10 – Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames

j. ANSI/DHI A115 Specifications for Hardware Preparations in Standard Steel Doors and Frames

k. ANSI/DHI A115.IG Installation Guide for Doors and Frames

3. Steel Door Institute:

a. SDI 105 – Recommended Erection Instructions for Steel Frames

b. SDI 106 – Recommended Standard Door Type Nomenclature

c. SDI 108 – Recommended Selection and Usage Guide for Standard Steel Doors

d. SDI 109 – Hardware for Standard Steel Doors & Frames

e. SDI 110 – Standard Steel Doors & Frames for Modular Masonry Construction

f. SDI 111 – Recommended Standard Details for Steel Doors and Frames

g. SDI 112 – Zinc-Coated (Galvanized/Galvannealed) Standard Steel Doors & Frames

h. SDI 122 – Installation and Troubleshooting Guide for Standard Steel Doors and Frames

i. SDI 124 – Maintenance of Standard Steel Doors and Frames

C. Provide door and frame assemblies that comply with NFPA 80, Standard for Fire Doors and Windows, and which have been tested, listed and labeled in compliance with ASTM E152, Standard Methods of Fire Tests of Door Assemblies by an independent agency acceptable to authorities having jurisdiction for all doors and frames installed in fire-rated assemblies and where indicated or required by authorities having jurisdiction. Doors and frames shall also comply with the following:

1. UL 10B Fire Tests of Door Assemblies for negative test pressure

2. UL 10C Standard for Safety Positive Pressure Fire Tests of Door Assemblies

3. NFPA 252 Fire Tests of Door Assemblies for negative test pressure

4. UBC 7-2-1997 Positive Pressure Fire Tests of Door Assemblies

5. Temperature Rise Rating: Provide doors that have temperature rise rating of 450 degrees F (232C) or 250 deg. F (121 C) maximum in 30 minutes of fire exposure in accordance with local building code.

D. All hollow metal borrowed lite s and doors shall comply with current state and local building codes.

1.05 SUBMITTALS

A. Provide manufacturer's product data, installation instructions, use limitations and recommendations for each door and frame product used. Provide manufacturers' certifications stating that products and assemblies comply with specification requirements. All Fire Doors shall bear UL label.
B. Provide large scale shop drawings, including plans, elevations, and details of anchors, anchor spacing, reinforcement, connections, hardware preparation, and accessory items required for fabrication and installation of all parts of the Work. Provide schedule of doors and frames using the same references used on Contract Documents.

1.06 DELIVERY, STORAGE AND HANDLING
   A. Strictly comply with all storage and handling requirements of the Steel Door Institute.
   B. Doors and frames shall be protected from all possible damage. Doors shall be individually wrapped in cartons and identified with mark and size. Store doors upright in a protected, dry area.
   C. In the event of damage, the General Contractor shall immediately make all replacements and repairs necessary, approved by the Architect, at no additional cost to the Owner.

1.07 PRE-INSTALLATION MEETING
   A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS
   A. Subject to compliance with requirements, provide products of one of the following manufacturers:
      1. Steelcraft
      2. Amweld
      3. Republic
      4. Deansteel

2.02 BASIC MATERIALS
   A. Hot rolled steel shall be commercial quality, pickled and oiled, in accordance with ASTM A 568 and ASTM A 569.
   B. Cold rolled steel shall be commercial quality carbon steel in accordance with ASTM-A1008/A1008M-00 or ASTM A 568.
   C. Galvanized sheet steel shall be roller leveled, commercial quality, hot dipped zinc and zinc-iron alloy coated, carbon steel sheets in accordance with ASTM-A653.
   D. Anchors and fasteners shall be the approved manufacturer's standard units fabricated from not less than 18 GA galvanized sheet steel or 18 GA hot-dip galvanized steel, in accordance with ASTM A 153, Class C or D.
   E. Shop primer shall be thermosetting rust inhibitive primer compatible with finish system specified in Section 09 91 13 - Painting.

2.03 FABRICATION
   A. Fabricate Work to be rigid, straight, plumb, level and square. Provide Work matching sizes, shapes, and profiles indicated on approved shop drawings.
   B. Fabricate exterior doors and frames from galvanized sheet steel with closed tops and bottoms and no places to catch or hold water.
   C. Fabricate concealed components in doors and frames from either hot or cold rolled steel. Exterior doors shall have concealed components and reinforcing galvanized with G90 coating.
   D. Fabricate doors and frames to receive mortised and concealed finish hardware as indicated on approved final hardware schedules. Comply with applicable provisions of ANSI A 115 for hardware preparation.
E. Locate hardware as indicated on final hardware shop drawings or, if not shown, in accordance with Recommended Locations for Builder's Hardware, published by Door and Hardware Institute.

2.04 FRAMES

A. Provide F Series hollow metal frames for both CMU and GWB installations, as manufactured by Steelcraft, or Architect approved equal by Amweld, Republic, or Deansteel, for doors, borrowed light frames, and other openings as scheduled. Use concealed fastenings wherever possible.

1. Fabricate exterior door frames from 14 GA. hot dipped zinc coated steel, in accordance with requirements of ASTM A 653 and A 924 for G90 coatings. Frame profiles shall be as called for on the Drawings.

2. Fabricate all interior door frames from 16 GA. steel sheet in accordance with requirements of ASTM A 568 or ASTM-A1008/A1008M-00. Interior door frames at areas subject to corrosive conditions, including but not limited to locker rooms, toilets, and kitchen, shall be hot dipped zinc-iron alloy coated steel, in accordance with requirements of ASTM A 653 and A 924 for A60 coatings. Frame profiles shall be as called for on the Drawings.

B. All steel frames shall be assembled with mitered and fully welded corners and seams to ensure the face miter seam is "closed and tight". Weld the face seam and the full web of the frame corner or intersection. Grind and dress welds and seams to be flush and invisible after priming. Apply a zinc rich primer over all ground areas of steel frames, and finish with a matching prime paint. Knock-down frames shall be provided as indicated in the door schedule.

C. Provide steel frames and components fabricated from the following sheet steel GA.s. All hinge, strike and closer reinforcements shall be projection welded to the door frames.

1. Plaster guards and mortar boxes: 26 GA.
2. Interior frames 4 ft. wide and smaller: 16 GA. steel
3. Interior frames over 4 ft. wide: 14 GA. steel
4. Exterior frames: 14 GA., G90 coatings
5. Floor anchors: 14 GA.
6. Strike reinforcement: 14 GA. steel
7. Closer reinforcement: 12 GA. steel
8. Head channel reinforcement for frames over 4' wide: 12 GA. steel
9. Hinge reinforcement: 10 GA. steel

D. Provide profiles and shapes as shown on the Drawings free of warp, buckles, fractures or other defects. Stops shall be formed integral with frames.

E. Provide anchors at each jamb for each 2 ft. - 6 in. of height or fraction thereof. At masonry wall locations provide T type or wire type. Provide Z type for metal studs. Provide floor anchors at both sides of all jambs. Provide UL approved anchors for fire-rated assemblies.

F. Prepare single door frames to receive 3 resilient silencers on strike jamb. Prepare double door frames to receive 2 resilient silencers at the center of the head jamb.

G. Stops shall be 5/8 in. minimum depth, cut-off and capped at 90° at 4 inches above finished floor at locker rooms, toilets, and kitchen, and where otherwise indicated. Fill and grind smooth, jamb joints below cut-off stops, making them imperceptible.

H. Interior Borrow Light Framing:

1. Frame assemblies for window walls and borrow lights shall be fabricated from commercial quality 14 GA. galvanized sheet steel. Frame assemblies at areas subject to corrosive conditions, including but not limited to locker rooms, toilets, and kitchen, shall be hot dipped zinc-iron alloy coated steel, in accordance with requirements of ASTM A 653 and A 924 for A60 coatings.

2. Frame components shall be either roll formed or brake formed. Sections shall be free of twist, bow and camber and fabricated as follows:

   a. Individual frame components shall be cut to length and notched to assure square joints and corners. All joints and corners of frames assemblies shall be continuously welded and ground smooth at the face of the sections to develop maximum structural strength.
b. Frame assemblies shall be shipped to jobsite completely welded. Field joints shall be permitted only when the size of the total assembly exceeds shipping limitations.

c. Clips for field connections shall be a minimum of 14 GA. steel.
d. Provide assemblies complete with 20 GA. channel glazing beads with countersunk holes for screw attachment to frame.

2.05 HOLLOW METAL DOORS

A. Exterior doors shall be L Series, as manufactured by Steelcraft, or Architect approved equal by Amweld, Republic, or Deansteel, fabricated in accordance with requirements of SDI Classification Level 3 Performance Level A - Extra Heavy Duty, Model 2, with minimum 16 GA. face sheets, seamless, hot dipped zinc coated steel complying with requirements of ASTM A 653 and A 924 for G90 coatings.

1. Vertical edges shall be stitch welded and filled. Welds are to be ground, filled, and dressed smooth to make them invisible and provide a smooth flush surface.

2. Hinge reinforcements shall be no less than 10 GA. plate 1-1/4 in. x full height of the door. The reinforcement shall be drilled and tapped in the field for continuous type hinges.

3. Tops and bottoms of all doors shall be reinforced with a continuous steel channel not less than 16 GA., extending the full width of the door and welded to the face sheet. Doors with an inverted top channel shall have a steel closure channel welded in place so the web of the channel is flush with the face sheets. Plastic fillers are not acceptable.

4. Door core shall be polystyrene to provide a minimum R-Value of 4, when tested in accordance with requirements of ASTM C 236 and SDI 113.

B. Interior doors requiring impact resistance shall be B Series, as manufactured by Steelcraft, or Architect approved equal by Amweld, Republic, or Deansteel, in accordance with requirements of SDI Classification Level 2, Performance Level B- Heavy Duty, Model 2, with minimum 18 GA. face sheets. This type of door shall be used at corridors, cafeteria, gymnasium, locker rooms, and other locations as noted.

1. Face sheets shall be commercial quality, cold rolled steel, in accordance with requirements of ASTM-A1008/A1008M-00 or ASTM A 366 and A 620.

2. Vertical edges shall be stitch welded and filled. Welds shall be ground, filled and dressed smooth to make them invisible and provide a smooth flush surface.

3. Hinge reinforcement shall be not less than 7 GA. (3/16 in.) plate 1-1/4 in. X 10 in. or a 12 GA. continuous channel with formed holes drilled and tapped. The manufacturer shall provide test information that the continuous type of reinforcement is equal to a 3/16 in. or 7 GA. plate.

4. Tops and bottoms of all doors shall be reinforced with a continuous 16 GA. steel channel extending the full width of the door and welded to the face sheet. Doors with an inverted top channel shall have a steel closure channel screwed in place so that the web of the channel is flush with the face sheets of the door.

5. Door cores shall have 20 GA., hat shaped, vertical steel stiffeners spanning the full thickness of the interior space between door faces. Stiffeners shall be spaced not more than 6” apart, and securely attached by stitch welds 6 in. on center to both face sheets. Spaces between stiffeners shall be filled with fiberglass insulation with a minimum density of 0.8 lbs/cubic ft.

C. Fire rated interior doors shall be T Series, as manufactured by Steelcraft, or Architect approved equal by Amweld, Republic, or Deansteel in accordance with requirements of SDI Classification Level 2, Performance Level B- Heavy Duty, Model 2, with minimum 16 GA. face sheets and mineral fiberboard composite construction. Doors shall have a 450°F temperature rise label. This type of door shall be required at all stair locations.

D. Standard interior doors shall be Series L 18, as manufactured by Steelcraft, or Architect approved equal by Amweld, Republic, or Deansteel, in accordance with requirements of SDI Classification Level 2, Performance Level B, Heavy Duty, Model 1, with minimum 18 GA. face sheets.
1. Face sheets shall be commercial quality, cold rolled steel, in accordance with requirements of ASTM-A1008/A1008M-00 or ASTM A 366 and A 620. Interior doors at areas subject to corrosive conditions, including but not limited to locker rooms, toilets, and kitchen, shall be hot dipped zinc-iron alloy coated steel, in accordance with requirements of ASTM A 653 and A 924 for A60 coatings.

2. Vertical edges shall be mechanically interlocked with a hairline edge seam.

3. Hinge reinforcement shall be not less than 7 GA. (3/16 in.) plate 1-1/4 in. X 10 in. or a 12 GA. continuous channel with formed holes drilled and tapped. The manufacturer shall provide test information that the continuous type of reinforcement is equal to a 3/16 in. or 7 GA. plate.

4. Reinforce tops and bottoms of all doors with a continuous steel channel not less than 16 gage, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel shall have a steel closure channel screwed in place so that the web of the channel is flush with the face sheets of the door.

5. Door cores shall be a one-piece resin-impregnated honeycomb or polystyrene core securely bonded to both face sheets.

2.06 GLAZING STOPS

A. Provide the approved manufacturer's standard rolled steel shapes with mitered corners and countersunk, tamper proof fasteners. Location of screw heads shall be on the inside, or least public side of door.

2.07 FINISHES

A. After fabrication, tool marks and surface imperfections shall be filled and sanded to make face sheets, vertical edges and weld joints free from irregularities.

B. Provide factory primed finish on all surfaces, including galvanized and galvannealed, with a minimum 1.0 mil dry film thickness of baked rust-inhibiting primer conforming to ANSI A250.10, and compatible with finish paint specified in Section 09 91 13 - Painting. All surfaces shall be prepared in accordance with specified reference standards and written requirements of the primer manufacturer.

C. Exposed galvanized surfaces of steel doors shall be solvent wiped before application of shop coat of paint.

D. All surfaces of door frames to be concealed by installation in an exterior wall, or in contact with concrete or masonry mortar, shall receive a 1/16 in. thick coating of asphalt emulsion, after priming.

2.08 PERIMETER SEALANT

A. Provide single-component, non-sag, moisture-cure, polyurethane sealant at door perimeter, Dymonic 100 as manufactured by Tremco, or Architect approved equal. The sealant shall comply with the following material and performance characteristics:

1. Volatile Organic Content: 40 g/l, maximum
2. Volatile Organic Emissions: Not greater than Greenguard Children & Schools Certification emissions levels
3. Tensile Strength: 350 to 450 PSI, in accordance with ASTM D412
4. Percent Elongation: 800 to 900%, in accordance with ASTM D412
5. Modulus at 100%: 75 to 85 psi, in accordance with ASTM D412
6. Tear Strength: 65 to 75 psi, in accordance with ASTM D412
7. Smoke Development: 5, in accordance with ASTM E84
8. Color: As selected by Architect from Manufacture’s standard and premium line of not less than 20 colors.
PART 3 - EXECUTION

3.01 INSPECTION
   A. The H.M. Door Installer shall examine supports and conditions under which this Work is to be performed and notify General Contractor in writing of conditions detrimental to the proper completion of the Work. Assure that frame openings correspond to dimensions of frame furnished. Do not proceed with installation until unsatisfactory conditions are corrected. Beginning Work means Installer accepts substrates and conditions.

3.02 INSTALLATION
   A. Installation shall be in accordance with the approved manufacturer's written instructions, except where more restrictive requirements are specified in this Section, and shall comply with applicable referenced standards.
   B. Frames shall be installed prior to erection of walls and ceilings, and accurately plumb, level, aligned, squared and braced. Provide anchors at each jamb for each 2 ft. 6 in. of height or fraction thereof, at hinge locations. At masonry wall locations provide T type or wire type. Provide Z type for metal studs. Provide floor anchors at both sides of all jambs. Provide UL approved anchors for fire-rated assemblies. Frames at masonry partitions, and elsewhere as noted in door schedule, shall be grouted solid.
   C. Install hinges supplied under Section 08 71 00 – Door Hardware, and hang doors accurately into frame openings with uniform tight clearances around jambs and head. Doors shall swing freely without binding or scraping and shall remain motionless at any location when released.
   D. Install glazing stops where scheduled or indicated. Provide symmetrically spaced fasteners not more than 8 in. O.C.

3.03 TOLERANCES
   A. Install fire-rated doors and frames with clearances and tolerances in accordance with NFPA Standard 80.
   B. Install non-rated doors and frames with clearances and tolerances in accordance with SDI-100.

3.04 ADJUSTING, TOUCH-UP AND REPAIR
   A. After installation of doors and hardware, adjust clearances and operating parts to Work easily, smoothly, and correctly. Doors shall not rub frame, scratch primer, nor bind.
   B. Touch-up damaged shop coatings and repair minor damage to eliminate all evidence of repair. Remove and replace Work which cannot be satisfactorily repaired.

3.05 RUBBISH REMOVAL
   A. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION
SECTION 08 36 10
SECTIONAL OVERHEAD DOORS

PART 1 - GENERAL

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

1.02 DESCRIPTION OF WORK
A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:
   1. Insulated steel sectional doors
   2. Complete operating door assemblies including guides, counter balances mechanisms, hardware, operators and installation accessories.

1.03 RELATED WORK SPECIFIED ELSEWHERE
A. Carefully examine all the Contract Documents for requirements which effect the Work of this Section.
B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
   2. Section 02 41 13 – Selective Demolition
   3. DIVISION 03 – CONCRETE; including all Sections contained therein
   4. DIVISION 04 – MASONRY; including all Sections contained therein
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
   7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
   8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
   9. DIVISION 09 – FINISHES; including all Sections contained therein.
   10. Section 21 00 00 – Fire Suppression
   11. Section 22 00 00 – Plumbing
   12. Section 23 00 00 - HVAC
   13. Section 26 00 00 – Electrical
   14. DIVISION 31 – EARTHWORK; including all Sections contained therein
   15. Section 32 12 00 – Site Improvements

1.04 REFERENCES
A. ASTM International (ASTM):
   1. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
B. American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE)
   1. ASHRAE Standard 90.1

1.05 PERFORMANCE REQUIREMENTS
A. Provide sectional overhead doors capable of withstanding the effects of gravity loads and stresses without evidencing permanent deformation of door components, in accordance with the following loads:
   1. Wind Loads: Uniform pressure (velocity pressure) of 30 lbf/sq. ft., acting inward and outward.
2. Air Infiltration: Maximum Rate: 0.08 cfm at 15 mph.
   a. Level of Protection: Enhanced Protection.
   b. Wind Zone One: 70 mph, pressure test to 3/4 and 1-1/2 x design pressure (positive and negative).
B. Provide sectional overhead door components and operators capable of operating for not less than 10,000 cycles.

1.06 SUBMITTALS
A. Provide submittals in accordance with requirements of Section 01 30 00 – Submittals.
B. Submit manufacturer’s data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
C. Submit Shop Drawings:
   1. Provide drawings indicating track details, head and jamb conditions, spring shafts, anchorage, accessories, finish colors, patterns and textures, operator mounts and other related information.
   2. Indicate door designs, configurations, window designs and glass lite materials.
   3. Regulatory Requirements and Approvals: Provide shop drawings in compliance with state and local code requirements.
D. Submit standard color chip samples

1.07 QUALITY ASSURANCE
A. Manufacturer Qualifications: Minimum 5-year experience manufacturing similar products.
B. Installer Qualifications: Minimum 2-year experience installing similar products.

1.08 DELIVERY, STORAGE, AND HANDLING
A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.
B. Handling: Handle materials to avoid damage.

1.09 WARRANTY
A. Warranty: Provide manufacturer’s standard limited lifetime warranty.
B. Finish Warranty: Provide 35 year finish warranty for eligible panel heights factory finished with the Trinar Premium Finish.

1.10 PRE-INSTALLATION MEETING
A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 - PRODUCTS

2.01 MANUFACTURER
A. Sectional overhead doors shall be Model CHT-714, as manufactured by Haas Door, or Architect approved equal by Clopay or Raynor, in sizes as indicated on the Drawings.
2.02 INSULATED STEEL SECTIONAL DOORS

A. Provide overhead sectional door operator, Control Hoist 2.0 Standard as manufactured by Raynor, or Architect approved equal. The door operator shall comply with the following requirements:
   1. Operator Type: Trolley
   2. Duty Cycle: 30/hr
   3. Drive: Belt
   4. NEMA Options: NEMA 12
   5. Motor: Continuous Duty 3/4 HP
   6. Circuit Board: Solid State Logic with LCD Display
   7. Power: 115/230V 1-Phase
   8. Brake: Trolley
   9. Wiring Options: 24V Class 2
   10. Warranty: 2 years

B. Tracks:
   1. Material: Hot-dipped galvanized steel (ASTM A-653)
   2. Configuration: Standard
   3. Size: 2 inches, track rollers consistent with track size, with hardened steel bearings

C. Counterbalance System:
   1. Provided with aircraft-type, galvanized steel lifting cables with minimum safety factor of 7. Torsion Springs consisting of heavy-duty oil-tempered wire torsion springs on a continuous ball-bearing cross-header shaft.
      a. Spring Cycle Life: 100,000 cycles

D. Hardware:
   1. Hinges and Brackets: Fabricated from hot-dipped galvanized steel, 14 GA. minimum. Double end hinges are supplied on doors 18 feet and wider.
   2. Exterior Lock Device: Exterior key lock with five-pin tumbler cylinder, night latch and steel bar engaging track.
   3. Interior Lock Device: Interior slide bar lock to be spring loaded, mounted on end stile and shall engage slot in track.

E. Weatherstripping:
   1. Perimeter Seal: Flexible perimeter seal for jambs and header.
   2. Bottom Seal: Full length vinyl astragal retainer. Weather strip to be "U" shaped flexible extruded vinyl.

F. Wind Loading:
   1. Wind Load Test Pressure: 1.5 times the Design Pressure.

G. Sectional Door Construction:
   1. Sections: Shall be 1-3/4 inches thick roll formed inside and outside, hot-dipped galvanized steel, insulated with high density polyurethane foam.
      a. 20 GA. smooth exterior and 20 GA. smooth interior.
   4. Exterior Panel Design: Flush
   5. Interior Design: V-groove on 3 inch centers

H. Insulation:
   1. Fully insulated section using high density CFC free polyurethane foam, pressure injected to completely fill the section. Calculated R value = 16.18, U value = .062.

I. End Stiles:
   1. Steel End Stile: 16 GA. hot-dipped galvanized steel, installed over vinyl end cap to maintain the thermal break.
J. Intermediate Reinforcing: Nominal 18 gauge full vertical steel back-up plates, inserted prior to foaming, to provide proper position and reinforcing for attachment of various hardware.

K. Exterior Finish Coat: Two-coat finish 1.0 mil total thickness painting process consisting of a bake-on urethane primer and a baked polyester finish.
   1. Color: Polar white

L. Interior Finish Coat: Two-coat finish 1.0 mil total thickness painting process consisting of a bake-on urethane primer and a baked polyester finish.
   1. Color: Polar white

PART 3 - EXECUTION

3.01 EXAMINATION
A. Do not begin installation until substrates have been properly prepared.
B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding

3.02 PREPARATION
A. Clean surfaces thoroughly prior to installation.
B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions

3.03 INSTALLATION
A. General: Install door, track and operating equipment complete with all necessary accessories and hardware according to shop drawings and manufacturer's instructions.
B. Lubricate bearings and sliding parts, and adjust doors for proper operation, balance, clearance and similar requirements.

3.04 ADJUSTING, CLEANING, PROTECTION
A. Touch-up Painting: Immediately after welding galvanized track to track supports, clean field welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A 780.
B. Repair minor damage to eliminate all evidence of repair. Remove and replace Work which cannot be satisfactorily repaired.
C. Clean exposed surfaces using materials and methods recommended by manufacturer of material or product being cleaned. Remove and replace Work that cannot be successfully cleaned.
D. Provide temporary protection to ensure Work being without damage or deterioration at time of final acceptance. Remove protections and reclean as necessary immediately before final acceptance.

3.05 RUBBISH REMOVAL
A. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION
PART 1 - GENERAL

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

1.02 DESCRIPTION OF WORK
   A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:
      1. Swinging doors.
      2. Other doors to the extent indicated.

1.03 RELATED WORK SPECIFIED ELSEWHERE
   A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.
   B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
      1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
      2. Section 02 41 13 – Selective Demolition
      3. DIVISION 03 – CONCRETE; including all Sections contained therein
      4. DIVISION 04 - MASONRY; including all Sections contained therein
      5. DIVISION 05 – METALS; including all Sections contained therein
      6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
      7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein
      8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein
      9. DIVISION 09 – FINISHES; including all Sections contained therein
     10. Section 21 00 00 – Fire Suppression
     11. Section 22 00 00 – Plumbing
     12. Section 23 00 00 - HVAC
     13. Section 26 00 00 – Electrical
     14. DIVISION 31 – EARTHWORK; including all Sections contained therein
     15. Section 32 12 00 – Site Improvements

1.04 CODES AND REFERENCES
   A. Comply with the version year adopted by the Authority Having Jurisdiction.
      1. 521 CMR – MA Architectural Access Board.
      5. NFPA 105 - Installation of Smoke Door Assemblies.
   B. Standards: All hardware specified herein shall comply with the following industry standards:
      1. ANSI/BHMA Certified Product Standards - A156 Series
      2. UL10C – Positive Pressure Fire Tests of Door Assemblies
1.05 SUBMITTALS

A. Provide submittals in accordance with requirements of Section 01 33 00 – Submittal Procedures, in accordance with requirements of the Contract Documents.

B. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

C. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
   1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
   2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
   3. Content: Include the following information:
      a. Type, style, function, size, label, hand, and finish of each door hardware item.
      b. Manufacturer of each item.
      c. Fastenings and other pertinent information.
      d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
      e. Explanation of abbreviations, symbols, and codes contained in schedule.
      f. Mounting locations for door hardware.
      g. Door and frame sizes and materials.
   4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

D. Shop Drawings: Details of electrified access control hardware indicating the following:
   1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
      a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
      b. Complete (risers, point-to-point) access control system block wiring diagrams.
   2. Electrical Coordination: Coordinate with related Division 26 Electrical Sections the voltages and wiring details required at electrically controlled and operated hardware openings.

E. Keying Schedule: Prepared under the supervision of the Owner, separate schedule detailing final keying instructions for locksets and cylinders in writing. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner to approve submitted keying schedule prior to the ordering of permanent cylinders.

F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.

G. Warranties and Maintenance: Special warranties and maintenance agreements specified in this Section.
1.06 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Installer Qualifications: Installers, trained by the primary product manufacturers, with a minimum 3 years documented experience installing both standard and electrified builders hardware 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.

C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor in good standing by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
   1. Scheduling Responsibility: Preparation of door hardware and keying schedules.

D. Automatic Operator Supplier Qualifications: Power operator products and accessories are required to be supplied and installed through current members of the manufacturer's "Power Operator Preferred Installer" program. Suppliers are to be factory trained, certified, and a direct purchaser of the specified power operators and be responsible for the installation and maintenance of the units and accessories indicated for the Project.

E. Source Limitations: Obtain each type and variety of Door Hardware specified in this Section from a single source, qualified supplier unless otherwise indicated.
   1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
   2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

F. Regulatory Requirements: Comply with NFPA 70, NFPA 80, NFPA 101 and ANSI A117.1 requirements and guidelines as directed in the model building code including, but not limited to, the following:
   1. NFPA 70 "National Electrical Code", including electrical components, devices, and accessories listed and labeled as defined in Article 100 by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
   2. Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," ANSI A117.1 as follows:
      a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
      b. Door Closers: Comply with the following maximum opening-force requirements indicated:
         1) Interior Hinged Doors: 5 lbf applied perpendicular to door.
         2) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
      c. Thresholds: Not more than 1/2 inch high. Bevel raised thresholds with a slope of not more than 1:2.
   3. NFPA 101: Comply with the following for means of egress doors:
      a. Latches, Locks, and Exit Devices: Not more than 15 lbf to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
      b. Thresholds: Not more than 1/2 inch high.
   4. Fire-Rated Door Assemblies: Provide door hardware for assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252 (neutral pressure at 40° above sill) or UL-10C.
      a. Test Pressure: Positive pressure labeling.

G. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.
H. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

I. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors’ personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures.

J. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.07 DELIVERY, STORAGE, AND HANDLING
A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.08 COORDINATION
A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.
C. Door and Frame Preparation: Related Division 08 Sections (Steel, Aluminum and Wood) doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.09 WARRANTY
A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
   1. Structural failures including excessive deflection, cracking, or breakage.
   2. Faulty operation of the hardware.
   3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:
   1. Ten years for mortise locks and latches.
   2. Five years for exit hardware.
   3. Twenty-five years for manual surface door closers.
   4. Two years for electromechanical door hardware.

1.10 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

B. Continuing Service: Beginning at Substantial Completion, and running concurrent with the specified warranty period, provide continuous (6) months full maintenance including repair and replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door opening operation. Provide parts and supplies as used in the manufacture and installation of original products.

1.11 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 – PRODUCTS

2.01 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

   1. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

      a. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

B. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.02 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles as specified in the Door Hardware Sets.

   1. Quantity: Provide the following hinge quantity, unless otherwise indicated:
Two Hinges: For doors with heights up to 60 inches.

Three Hinges: For doors with heights 61 to 90 inches.

Four Hinges: For doors with heights 91 to 120 inches.

For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

   a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
   b. Sizes from 3’1” to 4’0”: 5” heavy weight.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

   a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
   b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following where indicated in the Hardware Sets or on Drawings:

   a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the following applications:

      1) Out-swinging exterior doors.
      2) Out-swinging access controlled doors.
      3) Out-swinging lockable doors.

5. Acceptable Manufacturers:

   a. Bommer Industries (BO).
   b. Hager Companies (HA).
   c. McKinney Products (MK).

B. Continuous Geared Hinges: ANSI/BHMA A156.26 certified continuous geared hinge with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Provide concealed flush mount (with or without inset), full surface, or half surface, in standard and heavy duty models, as specified in the Hardware Sets. Concealed continuous hinges to be U.L. listed for use on up to and including 90 minute rated door installations and U.L. listed for windstorm components where applicable. Factory cut hinges for door size and provide with removable service power transfer panel where indicated at electrified openings. Coordinate with aluminum door manufacturer.

   1. Acceptable Manufacturers:

      a. Bommer Industries (BO).
      b. McKinney Products (MK).
      c. Pemko Manufacturing (PE).

2.03 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified automatic, self-latching, and manual flush bolts and surface bolts. Manual flush bolts to be furnished with top rod of sufficient length to allow bolt location approximately six feet from the floor. Furnish dust proof strikes for bottom bolts. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.

   1. Acceptable Manufacturers:

      a. Door Controls International (DC).
      b. Rockwood Manufacturing (RO).
      c. Trimco (TC).

B. Coordinators: ANSI/BHMA A156.3 certified door coordinators consisting of active-leaf, hold-open lever and inactive-leaf release trigger. Coordinators fabricated from steel with nylon-coated strike plates and built-in adjustable safety release.
1. Acceptable Manufacturers:
   a. Door Controls International (DC).
   b. Rockwood Manufacturing (RO).
   c. Trimco (TC).

C. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified below or in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
   1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
   2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
   3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
   4. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
      a. Acceptable Manufacturers:
         1) Burns Manufacturing (BU).
         2) Rockwood Manufacturing (RO).
         3) Trimco (TC).

2.04 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

C. Cylinders: Original manufacturer cylinders complying with the following:
   1. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
   2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
   3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
   4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
   5. Keyway: Owner to advise.

D. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:
   1. Removable Cores: Core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware. Provide removable core (small or large format) as specified in Hardware Sets.

E. Patented Cylinders: ANSI/BHMA A156.5, Grade 1, certified cylinders employing a utility patented and restricted keyway requiring the use of patented controlled keys. Provide bump resistant, fixed core cylinders as standard with solid recessed cylinder collars. Cylinders are to be factory keyed where permanent keying records will be established and maintained.
   1. Provide a 6 pin multi-level master key system comprised of patented controlled keys.
      a. Cylinders: Provide utility patented controlled keyway cylinders that are furnished with patented keys available only from authorized distribution.
   2. Acceptable Manufacturer:
      a. Sargent Manufacturing (SA) - Degree Series.
      b. Corbin Russwin (RU) – Access 3 Series.
      c. Schlage – Everest 29 Series.
      d. Medeco – X4 Series.
F. Keying System: Each type of lock and cylinders to be factory keyed. Conduct specified "Keying Conference" to define and document keying system instructions and requirements. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner. Incorporate decisions made in keying conference, and as follows:
   1. Grand Master Key System: Cylinders are operated by a change key, a master key, and a grand master key.

G. Key Quantity: Provide the following minimum number of keys:
   1. Top Master Key: One (1)
   2. Change Keys per Cylinder: Three (3)
   3. Master Keys (per Master Key Group): Two (2)
   4. Grand Master Keys (per Grand Master Key Group): Two (2)
   5. Construction Keys (where required): Ten (10)
   6. Construction Control Keys (where required): Two (2)
   7. Permanent Control Keys (where required): Two (2)

H. Construction Keying: Provide construction master keyed cylinders or temporary keyed construction cores where specified. Provide construction master keys in quantity as required by project Contractor. Replace construction cores with permanent cores. Furnish permanent cores for installation as directed under specified "Keying Conference".

I. Key Registration List: Provide keying transcript list to Owner's representative in the proper format for importing into key control software.

J. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.
   1. Acceptable Manufacturers:
      a. Lund Equipment (LU).
      b. MMF Industries (MM).
      c. Telkee (TK).

K. Key Control Software: Provide one network version of "Key Wizard" branded key management software package that includes one year of technical support and upgrades to software at no charge. Provide factory key system formatted for importing into "Key Wizard" software.

2.05 MECHANICAL LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified mortise locksets furnished in the functions as specified in the Hardware Sets. Locksets to be manufactured with a corrosion resistant, stamped 12 gauge minimum formed steel case and be field-reversible for handing without disassembly of the lock body. Lockset trim (including knobs, levers, escutcheons, roses) to be the product of a single manufacturer. Furnish with standard 2 3/4" backset, 3/4" throw anti-friction stainless steel latchbolt, and a full 1" throw stainless steel bolt for deadbolt functions.
   1. Acceptable Manufacturers:
      b. Sargent Manufacturing (SA) – 8200 Series.
      c. Schlage (SC) – L9000 Series.

B. Lock Trim Design: As specified in Hardware Sets.

C. Knurling: Where required by local code provide knurling or abrasive coating to all levers on doors leading to hazardous areas such as mechanical rooms, boiler and furnace rooms, janitor closets, and as otherwise required or specified.

2.06 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
   1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.

B. Standards: Comply with the following:
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.5.
4. Dustproof Strikes: BHMA A156.16.

2.07 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
   a. Fire Exit Removable Mullions: Provide keyed removable mullions for use with fire exit devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252. Mullions to be used only with exit devices for which they have been tested.
3. Except on fire rated doors, provide exit devices with key cylinder dogging device to hold the pushbar and latch in a retracted position.
4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is not acceptable except in any case where the door light extends behind the device as in a full glass configuration.
5. Flush End Caps: Provide heavy weight impact resistant flush end caps made of architectural metal in the same finish as the devices as in the Hardware Sets. Plastic end caps will not be acceptable.
   a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets. Provided free-wheeling type trim where indicated.
   b. Where function of exit device requires a cylinder, provide an interchangeable core type keyed cylinder (Rim or Mortise) as specified in Hardware Sets.
7. Vertical Rod Exit Devices: Provide and install interior surface and concealed vertical rod exit devices as Less Bottom Rod (LBR) unless otherwise indicated.
8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Mounting rails to be formed from smooth stainless steel, brass or bronze architectural materials no less than 0.072" thick, with push rails a minimum of 0.062" thickness. Painted or aluminum metal rails are not acceptable. Exit device latch to be investment cast stainless steel, pullman type, with deadlock feature. Coordinate with aluminum door shop drawings.

2.08 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:
1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.

2. Standards: Closers to comply with UL-10C and UBC 7-2 for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.

3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.

4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.

5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
   a. Where closers are indicated to have mechanical dead-stop, provide heavy duty arms and brackets with an integral positive stop.
   b. Where closers are indicated to have mechanical hold open, provide heavy duty units with an additional built-in mechanical holder assembly designed to hold open against normal wind and traffic conditions. Holder to be manually selectable to on-off position.
   c. Where closers are indicated to have a cushion-type stop, provide heavy duty arms and brackets with spring stop mechanism to cushion door when opened to maximum degree.
   d. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics. Provide drop plates or other accessories as required for proper mounting.

6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper mounting.

B. Door Closers, Surface Mounted (Large Body Cast Iron): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control.

1. Acceptable Manufacturers:
   a. Corbin Russwin Hardware (RU) - DC8000 Series.
   b. LCN Closers (LC) - 4040XP Series.
   c. Norton Door Controls (NO) – 9500 Series.
   d. Sargent Manufacturing (SA) - 281 Series.

2.09 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.

2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Metal Protection Plates: ANSI/BHMA A156.6 certified metal protection plates (kick, armor, or mop), beveled on four edges (B4E), fabricated from the following:
   a. Stainless Steel: 300 series, 050-inch thick, with countersunk screw holes (CSK).

4. Fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets.

5. Acceptable Manufacturers:
   a. Burns Manufacturing (BU).
   b. Rockwood Manufacturing (RO).
   c. Trimco (TC).
2.10 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

   1. Acceptable Manufacturers:
      a. Burns Manufacturing (BU).
      b. Rockwood Manufacturing (RO).
      c. Trimco (TC).

C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

   1. Acceptable Manufacturers:
      a. Rixson Door Controls (RF).
      b. Rockwood Manufacturing (RO).
      c. Sargent Manufacturing (SA).
      d. Glynn Johnson.

2.11 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

   1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

   1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Acceptable Manufacturers:

   1. National Guard Products (NG).
   2. Pemko Manufacturing (PE).

2.12 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.
2.13 FINISHES
   A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
   B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.
   C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.01 EXAMINATION
   A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
   B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.02 PREPARATION

3.03 INSTALLATION
   A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
      1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
   B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
      2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
      3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
      4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
   C. Power Operator products and accessories are required to be installed through current members of the manufacturer's "Power Operator Preferred Installer" program.
   D. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
   E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
   F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.
3.04 FIELD QUALITY CONTROL
   A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.05 ADJUSTING
   A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.06 CLEANING AND PROTECTION
   A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install all hardware at the latest possible time frame.
   B. Clean adjacent surfaces soiled by door hardware installation.
   C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.07 DEMONSTRATION
   A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.08 DOOR HARDWARE SCHEDULE
   A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
   B. Manufacturer's Abbreviations:
      1. MK – McKinney
      2. PE – Pemko
      3. RU – Corbin Russwin
      4. MC – Medeco
      5. RO – Rockwood
      6. RF – Rixson
      7. 00 - Other

Hardware Schedule

Set: 1.0- Door No. 3, 4
Description: Interior H.M. Single, Push/Pull, Keyed

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Model/Type</th>
<th>Manufacturer Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Hinge</td>
<td>CFM-SLF-HD1</td>
<td>PE</td>
</tr>
<tr>
<td>Cylinder Housing</td>
<td>1070 Series</td>
<td>RU</td>
</tr>
<tr>
<td>Core</td>
<td>Keyed as directed</td>
<td>MC</td>
</tr>
<tr>
<td>Concealed Overhead Stop</td>
<td>1-X36</td>
<td>RF</td>
</tr>
<tr>
<td>Closer (surface)</td>
<td>DC8200 Series</td>
<td>RU</td>
</tr>
</tbody>
</table>

Door Hardware
08 71 00 - 13
**Set: 2.0 – Door No. 2.8**

<table>
<thead>
<tr>
<th>Description</th>
<th>Model</th>
<th>Quantity</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Hinge</td>
<td>CFM-SLF-HD1</td>
<td>1</td>
<td>PE</td>
</tr>
<tr>
<td>Cylinder Housing</td>
<td>1070 Series</td>
<td>1</td>
<td>RU</td>
</tr>
<tr>
<td>Core</td>
<td>Keyed as directed</td>
<td>1</td>
<td>MC</td>
</tr>
<tr>
<td>Door Pull</td>
<td>BF158 Mtg-Type 1</td>
<td>1</td>
<td>US32D</td>
</tr>
<tr>
<td>Concealed Overhead Stop</td>
<td>1-X36</td>
<td>1</td>
<td>RF</td>
</tr>
<tr>
<td>Closer (surface)</td>
<td>DC8200 Series</td>
<td>1</td>
<td>RU</td>
</tr>
<tr>
<td>Threshold (therm-barrier)</td>
<td>274x224AFGT MSES25SS</td>
<td>1</td>
<td>PE</td>
</tr>
<tr>
<td>Sweep</td>
<td>18061CNB</td>
<td>1</td>
<td>PE</td>
</tr>
<tr>
<td>Door Contact</td>
<td>By Security Vendor</td>
<td>1</td>
<td>00</td>
</tr>
</tbody>
</table>

END OF SECTION
PART 1 - GENERAL

1.01 RELATED DOCUMENTS
   A. All the Contract Documents, including Drawings, General Conditions, and all Sections of Division 1 - General Requirements, apply to the Work of this Section.

1.02 DESCRIPTION OF WORK
   A. The Work of this Section includes, but is not limited to, furnishing and installation of glass and glazing for the following:
      1. Forced entry glass at borrowed light frames
      2. Doors not indicated to be pre-glazed
      3. Non-Electronic Speaker Port
      4. Transaction drawer

1.03 RELATED WORK SPECIFIED ELSEWHERE
   A. Carefully examine all the Contract Documents for requirements which effect the Work of this Section.
   B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
      1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
      2. Section 02 41 13 – Selective Demolition
      3. DIVISION 03 – CONCRETE; including all Sections contained therein
      4. DIVISION 04 – MASONRY; including all Sections contained therein
      5. DIVISION 05 – METALS; including all Sections contained therein.
      6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
      7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
      8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
      9. DIVISION 09 – FINISHES; including all Sections contained therein.
     10. Section 21 00 00 – Fire Suppression
     11. Section 22 00 00 – Plumbing
     12. Section 23 00 00 - HVAC
     13. Section 26 00 00 – Electrical
     14. DIVISION 31 – EARTHWORK; including all Sections contained therein
     15. Section 32 12 00 – Site Improvements
   C. Work of this Section shall withstand normal loads due to wind, temperature and normal impact without failure, breakage of glass or seals, fogging or other defects.
      1. Glass and glazing shall function correctly and normally throughout an ambient temperature range of 100°F above and below installation temperature.
      2. Insulated units shall be free from internal dirt, moisture, condensation, fogging, deterioration of protected internal glass coating, and visual evidence of seal failure throughout the warranty period.
      3. Coated glass shall be free from peeling, cracking, hazing, visual non-uniformity, and other defects throughout the warranty period.
1.04 QUALITY ASSURANCE
   A. Requirements of Regulatory Agencies: Install glass and glazing to meet requirement of Local Building Code.
      1. Fenestration glazing shall comply with Commonwealth of Massachusetts Energy Code, 780 CMR, Chapter 13, Section 1304.3.
      2. All glazing shall comply with current state and local building codes.
   B. Reference Standards:
      1. Federal Specifications:
         a. FS-DD-G-451, Glass, Float or Plate, Sheet, Figured (Flat, For Glazing, Mirrors and Other Uses).
         b. FS-DD-G-1403, Glass, Plate (Float) Sheet, Figured and (Heat Strengthened and Fully Tempered).
         c. FS-TT-S00230, Sealing Compound: Elastomeric Type, Single Component (For Caulking, Sealing and Glazing in Buildings and Other Structures).
      2. Sealed Insulating Glass Manufacturers Association (SIGMA): Sigma 70-7-1, Glazing Recommendation for Sealed Insulating Glass Units.
      5. Safety Glass Standards: Provide safety glass which complies with ANSI Z97.1 and requirements of 16 CFR Part 1201 for category II materials and is permanently marked with certification label of Safety Glass Certification Council.
   C. Determine exact sizes and thicknesses of glass products and certify that the Work of this Section meets or exceeds the performance requirements specified in this Section. Provide proper thicknesses, edge clearances and tolerances to comply with the recommendations of the glass manufacturer. Provide thicknesses required for application indicated.

1.05 SUBMITTALS
   A. Submit manufacturer's descriptive data, installation instructions, use limitations and recommendations for each type of glass. Provide certifications stating that materials comply with requirements.
   B. Submit example copies of manufacturer's warranties before ordering materials.
   C. Provide glass manufacturer's wind load charts, calculations and certification of the performance of this Work. Show how design load requirements and other performance criteria have been satisfied.
   D. Submit three 12 in. x 12 in. samples of each glass and glazing material that is to be used in the Work. Provide 12 in. long samples of sealant and glazing materials. Samples of single thickness, non-fabricated clear glass are not required.
   E. Submit certified reports for tests required.

1.06 DELIVERY, STORAGE AND HANDLING
   A. Deliver materials and products in labeled, protective packages. Store and handle in strict compliance with manufacturer's instructions and recommendations of FGMA Handbook.
      1. Protect from all possible damage.
      2. Keep shipping containers closed when not in use.
      3. Protect materials during storage from moisture, sunlight, excess heat, sparks and flame.
      4. Carefully store materials to avoid overloading any building component or structure.
      5. Provide adequate ventilation to prevent build-up of dangerous solvent concentrations.
      6. Use clean gloves and tools when handling materials. Avoid contamination.
      7. Use rolling blocks and suction cups to move glass units not in shipping crates.

1.07 PROJECT CONDITIONS
   A. Perform Work only when existing and forecasted weather conditions are within the limits established by manufacturers of the materials and products used.
B. Install sealants only when temperatures are within the recommended range established by sealant manufacturer and never below 40 deg. F.

1.08 WARRANTIES
A. Provide written warranties signed by manufacturer and Installer, agreeing to repair or replace Work which exhibits defects in materials or Workmanship for the following periods. "Defects" is defined to include, but is not limited to, leakage of water, abnormal aging or deterioration, failure of hermetic seal in insulating units, edge separation or delamination of laminated glass, peeling, cracking, crazing or other failure of metallic coatings in coated glass, spoiling of mirrors, and failure to meet requirements of Contract Documents. Provide warranty periods standard with manufacturer, but not less than the following:

1. Insulating Glass: 10 years from date of Substantial Completion
2. Coated Glass: 5 years from date of Substantial Completion
3. Laminated Glass: 4 years from date of Substantial Completion
4. Mirror Glass: 10 years from date of Substantial Completion

1.09 MAINTENANCE STOCK
A. Provide one packaged, wrapped and labeled maintenance stock item for each different type and size of glass used on the project, except single pane clear glass which is not heat treated.

1.10 PRE-INSTALLATION MEETING
A. The Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the Contractor, Architect, and related Subcontractors.

PART 2 - PRODUCTS

2.01 GLASS MATERIALS AND PRODUCTS
A. Clear Tempered Glass shall be 1/4 in., Condition A, Type I, Class 1, Quality q3, Kind FT, in accordance with requirements of ASTM C 1036 and C 1048. Tempered glass shall be subjected to quality control measures to minimize inclusions which could result in spontaneous breakage. Such inclusions are defined as a material defect by this specification. Installed tempered glass which experiences spontaneous breakage shall be replaced (material and labor) under the warranty provisions.

B. Forced Entry Glass shall be 5/16 in., ASTM F1233 Class 1.3, Childgard as manufactured by Global Security Glazing, or Architect approved equal, by LTI Smart Glass, Inc., or Dlubak Corporation.

2.02 GLAZING TYPES
A. Glazing types shall be as follows:
   1. Type 1: 1/4 in. clear tempered glass
   2. Type 2: 5/16 in. forced entry glass

2.03 GLAZING MATERIALS AND PRODUCTS
A. Provide sealants and gaskets which have performance characteristics suitable for applications intended. Make sure that glazing sealants are compatible with sealants used in insulated glass fabrication, with laminated glass inner layer, and with surfaces to be in contact. Provide colors of sealants and gaskets as selected by Architect from the approved manufacturer's complete selection of standard and premium colors.

B. Provide sealant compatible with all substrates and materials and having maximum Shore A hardness of 50. Provide products as specified in Section 07 92 00 - Sealants.
C. Provide non-acid curing sealant having movement range of ± 50% when tested according to ASTM C719. Provide products as specified in Section 07 92 00 – Sealants.

D. Provide preformed butyl-polyisobutylene rubber glazing tape with 100% solids content in extruded tape roll form and complying with AAMA 804.1. Provide one of the following products if they meet or exceed the requirements of these specifications:
   1. Protective Treatments 303 or 606
   2. Tremco Preshimmed 440
   3. Woodmouse Chem-Tape 40

E. Provide extruded black sponge gaskets and weatherstrips conforming to ASTM C509 with Shore A durometer hardness of 40 +/-5 and 20% to 35% compression. Provide black extruded dense gaskets conforming to ASTM C864 with Shore A durometer hardness of 75 +/-5 for hollow profiles and 60 +/-5 for solid profiles. Provide neoprene outdoor gaskets and neoprene or EPDM indoor gaskets. Injection mold all corners of gaskets where compatible with installation procedures. Design interior and exterior gasket profiles to produce a glass edge pressure of not less than four pounds per linear inch and not more than ten pounds per linear inch.

F. Provide dense extruded neoprene or silicone setting blocks with a hardness of 85 ±5 Shore A Durometer hardness, a minimum length of 4 in. and a minimum width equal to the glass thickness. Provide materials as recommended and approved by glass and sealant manufacturers. Provide products certified by their manufacturers to be "silicone compatible". Provide materials as recommended and approved by glass and sealant manufacturers. Provide products certified by their manufacturers to be "silicone compatible". Provide silicone side blocks for insulating units with silicone edge seals. Neoprene side blocks are acceptable only if permitted by the insulating glass fabricator.

G. Provide flexible, resilient polyethylene foam, urethane foam, or extruded silicone sealant backer rods in accordance with the approved sealant and glass manufacturers written requirements.

I. Provide cleaners, primers and sealers in accordance with the approved sealant and glass manufacturers written requirements.

2.04 NON-ELECTRONIC SPEAKER PORT

A. Provide non-electronic speaker port ANSV-6 Voice Port Covers as manufactured by Armortex, or Architect approved equal. The speaker port shall comply with the following characteristics:
   1. 7 in. diameter
   2. 12 GA. stainless steel exterior cover with #3 brushed finish
   3. Prime painted ballistic steel interior
   4. Stainless steel mounting screws
   5. 4 in. to 6 in. diameter mounting hole required
   6. Minimum 5/16 in. thick glazing

2.05 TRANSACTION DRAWERS

B. Provide 12 GA. transaction drawers, Armortex-020 as manufactured by Armortex, or Architect approved equal. The transaction drawers shall comply with the following characteristics:
   1. 17 3/4 in. wide x 24 in. deep x 7 in. high
   2. Stainless steel #3 brushed (Front) finish
   3. Ballistic Levels 1 thru 3
PART 3 - EXECUTION

3.01 INSPECTION
   A. The Glazing Subcontractor shall examine substrates, supports, and conditions under which this Work is to be performed and notify the General Contractor, in writing, of conditions detrimental to the proper completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected. Beginning Work means Installer accepts substrates and conditions.

3.02 PREPARATION AND GLAZING
   A. All Work of this Section shall comply with requirements of the FGMA Glazing Manual, and the approved manufacturer's written instructions and recommendations, except where more restrictive requirements are specified in this Section. Do not glaze when ambient temperature is below 40°F.
      1. Inspect all glass before installation. Do not install defective glass.
      2. Check glass for correct size and squareness. Adjust frame or glass size to correct as necessary.
      3. Protect glass from edge damage. Replace all damaged or weakened glass.
      4. Remove coatings which are not firmly bonded to substrates. Remove lacquer, if any.
      5. Center glass in opening and provide minimum 1/2 in. glass bite and 1/8 in. minimum edge clearances.
      6. Place setting blocks at quarter points and side blocks at upper half of each side.
      7. Securely set setting blocks and side blocks in position to prevent displacement.
      8. Keep weeps clear.
      9. Prevent metal to glass contact. Protect edges of insulating units from solvents and damage.
     10. Replace stops and clean and prime stops, framing, and glass on both sides.
     11. Cap seal all exterior joints between glazing and framing with clear liquid sealant.
     12. Cap seal with a uniform fillet sealant joint having proper bite on both glass and framing.
     13. Clean, prime and mask for liquid sealants immediately before sealant application.
     14. Apply wet sealant in continuous motion and tool thoroughly to "wet" contact surfaces uniformly.
     15. Slope sealant to promote drainage away from glass and sealant.
     16. Defer glazing of openings needed for construction operations until directed.

3.03 CLEANING AND PROTECTION
   A. Remove excess sealant and labels from glass surfaces. Clean exposed surfaces using materials and methods recommended by manufacturer of material or product being cleaned. Remove and replace Work that cannot be successfully cleaned. Provide temporary protection to ensure Work being without damage or deterioration at time of final acceptance. Do not apply markers to surfaces of glass. Clean frequently, if necessary, to remove build-up of potentially harmful construction contaminants. Re-clean all glass within one week of final acceptance of the project.
   B. Remove and replace all broken, chipped, cracked, scratched or otherwise damaged glass from whatever cause.

3.04 RUBBISH REMOVAL
   A. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION
SECTION 09 22 16
NON-STRUCTURAL METAL FRAMING AND GYPSUM BOARD

PART 1 - GENERAL

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

1.02 DESCRIPTION OF WORK
A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:
1. Metal framing and support systems for gypsum drywall, abuse resistant gypsum panels, and related accessories
2. Gypsum Wallboard, Abuse Resistant Gypsum Wallboard, and related accessories
3. Fiberglass insulation at interior partitions and other locations as indicated on the Drawings
4. Miscellaneous metal framing and blocking to support other Work
5. Surface finishing in preparation for painting and finishing
6. Grouting of rated metal door frames in metal stud partition systems at locations indicated
7. Accessories, including fasteners, taping materials, and sealants, necessary for a complete installation
8. Gypsum wallboard assemblies for chases, mechanical equipment noise control enclosures, and other miscellaneous enclosures

B. Items to be Installed Only: Install the following items as furnished by the designated Sections:
1. Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Security Sections: Access panels, sleeves for piping and conduit to be built into the Work of this Section.

1.03 RELATED WORK SPECIFIED ELSEWHERE
A. Carefully examine all of the Contract Documents for requirements which affect the Work of this Section.
B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:
1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
2. Section 02 41 13 – Selective Demolition
3. DIVISION 03 – CONCRETE; including all Sections contained therein
4. DIVISION 04 – MASONRY; including all Sections contained therein
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
9. DIVISION 09 – FINISHES; including all Sections contained therein.
10. Section 21 00 00 – Fire Suppression
11. Section 22 00 00 – Plumbing
12. Section 23 00 00 - HVAC
13. Section 26 00 00 – Electrical
14. DIVISION 31 – EARTHWORK; including all Sections contained therein
15. Section 32 12 00 – Site Improvements
1.04 PERFORMANCE REQUIREMENTS
A. Delegated Design: Design framing, including comprehensive engineering analysis by a qualified professional engineer registered in the state in which the Project occurs, using performance requirements and design criteria indicated.

B. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.
   1. Design loads in accordance with current building code requirements and the Contract Documents.
   2. Deflection limits of framing systems shall withstand design loads within deflections greater than Horizontal deflection of L/360 of the wall height under a horizontal load of 5 lbs./sq. ft.
   3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg. F.
   4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load, plus superimposed dead load, deflection of primary building structure.

C. Sound Transmission Performance:
   1. Provide gypsum drywall assemblies with a minimum STC value of 47 at Administrative, Guidance, and SPED Suites, when tested in accordance with ASTM E90.

1.05 QUALITY ASSURANCE
A. Structural Performance for all Interior Work: Limit deflection to L/360 for ceramic tile and other rigid finishes; do not exceed L/240 for all other finishes. Lateral load is 5 psf.

B. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, ductility, and metallic-coating thickness.


D. Anchorage: Coordinate anchorage to concrete and steel with project structural requirements, through the submittal process as specified.

E. Installation shall be performed by a firm with a minimum of ten-year experience in Work of the type required by this Section. Conduct pre-installation conference at Project site in accordance with requirements of Division 01 and this Section.
   1. Provide materials which are the products of one manufacturer for each type of material required for the Work of this Section. Provide secondary accessory materials acceptable to the approved manufacturer of the primary materials and the Architect.

F. Reference Standards: Comply with applicable requirements of the following:
   1. AISI Standard; North American Specification for the Design of Cold-Formed Steel Structural Members
   2. AISI Standard for Cold-Formed Steel Framing - General Provisions
   3. AISI Standard for Cold-Formed Steel Framing - Truss Design
   4. AISI Standard for Cold-Formed Steel Framing - Header Design

1.06 TESTS
A. Where fire-resistance ratings are indicated or required by authorities having jurisdiction, provide materials and construction which are identical to assemblies whose fire-resistance rating has been tested in compliance with ASTM E119 and ASTM E136 by independent agencies acceptable to the Architect and authorities having jurisdiction.
SUBMITTALS

A. Submit manufacturers product literature for all items with schedule of use, installation instructions, and recommendations for each material used.

B. Submit manufacturers certificates demonstrating compliance with applicable code for fire-rated assemblies.

C. Shop Drawings: Show layout, spacing, sizes, thicknesses, and types of metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work including but not limited to the following items:
   1. Details of all unusual conditions in connection with gypsum drywall construction.
   2. Proposed locations of control joints that are required but not shown.
   3. Locations of access doors occurring in gypsum drywall construction.
   4. Details of attachment to primary ceiling supports.
   5. Details of rated assemblies with copies of their respective approval.
   6. Anchorage to concrete and steel for approval by Structural Engineer.

D. Delegate design submittal for metal framing as indicated to comply with performance requirements and design criteria, including analysis/calculation data bearing the seal and signature of the Professional Engineer registered in the state responsible for their preparation.

E. Welding certificates.

F. Qualification data for professional engineer.

G. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:
   1. Steel sheet
   2. Expansion anchors
   3. Power-actuated anchors
   4. Mechanical fasteners
   5. Vertical deflection clips
   6. Miscellaneous structural clips and accessories

H. Samples:
   1. One foot square samples of board materials.
   2. One foot long Sections of all galvanized steel or zinc members and accessories.

DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products in unopened factory labeled packages. Store and handle in strict compliance with manufacturers ft. instructions and recommendations. Protect from damage. Adequately support stored gypsum panels to avoid sagging. Avoid overloading floor system. Protect metal lath, metal suspension materials and metal accessories from dampness and wetting. Keep plaster and other cementitious materials dry until ready to be used. Store off ground, under cover, and away from sweating walls and other damp surfaces.

B. Deliver fire-rated materials in original, unopened containers, bearing testing agency label and required fire classification numbers.

PROJECT CONDITIONS

A. Perform Work only when existing and forecasted weather conditions are within the limits established by manufacturers of the materials and products used. Comply with requirements of Gypsum Association publication 220.

B. Proceed with installation of gypsum board products provided under the Work of this Section only when steel framing Work is completed in accordance with installation tolerances specified in ASTM C 754 and this specification Section.

C. Do not expose gypsum boards or metal accessories to weather during storage.
D. Comply with the approved manufacturers requirements and Gypsum Association publication 216. Avoid too rapid drying in hot weather.

1.10 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

B. Items such as exterior finish assemblies, wall interfacing, expansion joint locations, caulking materials, fire-safing applications, mechanical and electrical wall penetration treatment shall be reviewed.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Gypsum Board: Provide products of one of the following manufacturers if they meet or exceed the requirements of these specifications:
   1. United States Gypsum Company
   2. LaFarge
   3. National Gypsum Company

B. Metal Framing and Support: Provide products of one of the following manufacturers if they meet or exceed the requirements of these specifications:
   1. Clark Dietrich
   2. United States Gypsum Company
   3. MarinoWare

C. Grid Suspension Systems: Provide products of one of the following manufacturers if they meet or exceed the requirements of these specifications:
   1. United States Gypsum Company
   2. Chicago Metallic Corp.
   3. National Rolling Mills

2.02 GYPSUM BOARD MATERIALS

A. Abuse Resistant Gypsum Wallboard shall be Sheetrock Mold Tough Very High Impact (VHI) Firecode X, as manufactured by United States Gypsum Company or Architect approved equal to provide a Category 3, Heavy Duty assembly. Provide one layer of 5/8 in. abuse resistant gypsum board as indicated on the Drawings, except at fire rated partitions and assemblies. Panels shall be a non-combustible combination of gypsum, cellulose fiber, and reinforcing fiber mesh, with paper face, complying with requirements of ASTM C 36 and C 1278, and the following material and performance characteristics:
   1. Thickness: 5/8 in.
   2. Weight: 2.8 lbs./SF
   3. Flame Spread: 5, in accordance with ASTM E 84
   4. Smoke Developed: 0, in accordance with ASTM E 84
   5. Recycled Content: 95%
   6. Mold Resistance: 10, in accordance with ASTM D3273
   7. Abrasion Resistance: Level 2.059 in. in accordance with ASTM C1629
   8. Indentation Resistance: Level 1, 0.15 in. in accordance with ASTM C1629
   9. Soft Body Impact: Level 3, 300 ft./lbs. in accordance with ASTM C1629
   10. Hard Body Impact: Level 3, 150 ft./lbs. in accordance with ASTM C1629
   11. Flexural Strength: 243 ft. lbs., either direction
   12. Edges: Tapered
   13. Ends: Square
B. Gypsum Wallboard shall be Sheetrock Mold Tough Firecode X, as manufactured by United States Gypsum Company, or Architect approved equal. Panels feature a non-combustible, moisture resistant gypsum core, complying with requirements of ASTM C1396, and the following material and performance characteristics:

1. Thickness: 5/8 in.
2. Weight: 2.2 lbs./SF
3. Flame Spread: 15, in accordance with ASTM E 84
4. Smoke Developed: 0, in accordance with ASTM E 84
5. Recycled Content: 100%
6. Edges: Tapered
7. Ends: Tapered

2.03 METAL FRAMING AND SUPPORTS

A. Provide steel studs, runners, furring, and channels, hot dip galvanized, in accordance with ASTM A 653 and C 645, as follows:

1. Depth shall be as indicated on the Drawings, including but not limited to, 3-5/8 in., 6 in., and 8 in.
2. Gauge shall be 25 EO, 0.15 in. bare metal; .034 in. dimple to dimple, unless otherwise required by the approved manufacturer to comply with conditions, spans and deflection constraints indicated. Provide 20 DW gauge EO, .025 in. bare metal; .055 in. dimple to dimple studs for walls supporting rigid finishes, including but not limited to, fiber cement panels, ceramic tile, and silicone treated, fiberglass reinforced, gypsum board at exterior walls. Provide 16 DW gauge EO, .025 in. bare metal; .055 in. dimple to dimple studs for exterior framing at soffits, fascias, and mansards, unless otherwise noted or required.
3. Runner channel shall match stud type as recommended by the approved stud manufacturer.
4. Provide 25 gauge, G60 galvanized furring in accordance with ASTM A 653 and C 645, and 20 gauge where spans exceed 4 ft. Furring shall be hat shaped or Z-shaped necessary to complete the Work. Where indicated as resilient, provide special sound transmission reducing type, USG RC1, or Architect approved equal.
5. Provide 18 gauge, G60, 2-1/2 in. studs and furring channels to support cement board panels.
6. Hanger Wire shall be 9 gauge, soft temper, Class 1, galvanized, complying with ASTM A 641.

B. Provide 1/2 in. thick, 60-durometer rubber isolator bushing, Kinetics Model KAI-S, as manufactured by Kinetics Noise Control, Inc., or Architect approved equal. Unit shall prevent any rigid contact of the anchor to the base and/or top plate of the stud wall.

C. Provide 1/2-in. thick bearing pad, Model Wallmat, as manufactured by Kinetics Noise Control, Inc., or Architect approved equal. Pad shall be designed to carry continuous loads up to 25-psi without excessive creep or pad failure. Pad deflection shall be 0.175 in. (4-mm) at maximum rated load.

2.04 METAL TRIMS AND ACCESSORIES

A. Provide galvanized steel trim units for interior Work at all areas subject to high humidity, including locker rooms, shower rooms, and kitchen. Provide the following trim and accessory types as manufactured by United States Gypsum, or Architect approved equals from a specified manufacturer:

1. Corner Bead: USG No. 103, 1-1/4 in.x1-1/4 in., or Architect approved equal
2. Control Joint: USG No. 093, 1/4 in. wide by 7/16 in. deep opening, or Architect approved equal
3. Edge Trim: USG No. 801-A and 801-B, or Architect approved equal

B. Channels:

1. Furring channels shall be USG No. DWC-25 and DWC-20, or Architect approved equal
2. Resilient furring channels shall be USG No. RC-1, or Architect approved equal
3. Cold rolled channels shall be 16 gauge, galvanized steel, as manufactured by USG, or Architect approved equal
2.05 JOINT MATERIALS
   A. Joint Compound shall be Durabond, as manufactured by USG, or Architect approved equal, at areas to receive abuse resistant gypsum wall panels. Provide water resistant compound, USG Sheetrock Brand WR, or Architect approved equal, at locations of water, mold, and moisture resistant gypsum wall panels.
   B. Joint tape shall be non-perforated paper tape, complying with requirements of ASTM C 475.
   C. Provide Sheetrock Brand, Tuff-Hide Primer-Surfacer, as manufactured by United States Gypsum, or Architect approved equal, at locations of abuse resistant gypsum wall panels, to provide a Level 4 finish.

2.06 MISCELLANEOUS MATERIALS
   A. Acoustical sealant shall be non-drying, non-hardening, non-bleeding, non-staining sealant complying with ASTM C 834 and C 919, USG Acoustical Sealant, or Architect approved equal by Pecora or Tremco.
   B. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035 or ASTM A 780.
      1. Provide interior, field-applied paint with a VOC content of 250 g/L or less, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   C. Nonmetallic, Non-shrink Grout: Premixed, nonmetallic, noncorrosive, non-staining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.
   D. Shims: Load bearing, high-density multi-monomer plastic, non-leaching.
   E. Fiberglass insulation at interior partitions and other locations as indicated on the Drawings, including exterior soffits and fascias framed under the work of this Section, shall be Type I, un-faced, inorganic fiber blankets, complying with ASTM C 665, with the following features and characteristics:
      1. Thickness: 3-1/2 in., 6 in., or as otherwise required to fill cavity.
      2. Flame Spread: 10; in accordance with ASTM E84
      3. Smoke Developed: 0; in accordance with ASTM E84
      5. Fire Resistance Ratings: Passes ASTM E 119 as part of a complete fire tested wall assembly.
      6. Dimensional Stability: Linear Shrinkage less than 0.1%
      7. Recycled Content: 30% post-consumer
   F. Laminating adhesive shall be as recommended by the approved gypsum board manufacturer.
   G. Fasteners shall be Type S, bugle head, for attaching gypsum panels to steel framing. Fasteners for fiber cement panels attached to steel framing shall be corrosion resistant, Hi-Lo, S-12, bugle head screws. Provide wafer head, Climaseal coated, Type S-12 self-drilling screws for attaching silicone treated sheathing to steel framing. Provide stainless steel fasteners for all fasteners in wet or humid areas, including but not limited to, exterior assemblies, toilet rooms, shower rooms, locker rooms, and kitchen. Provide other types in accordance with requirements of the approved gypsum board or fiber cement board manufacturer. All fasteners shall provide a minimum of 3/4 in. penetration through steel framing.
   H. Provide screws, bolts, powder actuated fasteners, inserts and other fasteners that are customarily used in standard construction practices and which are proven capable of supporting at least 3 times design load.
   I. Grout for metal door frames shall be Structo-Base Gypsum plaster, as manufactured by U. S. Gypsum or Architect approved equal, complying with ASTM C 28 and C 472.
   J. Provide rigid vinyl trim at locations where gypsum board edge is exposed or abutting dissimilar materials, except at all areas of interior Work subject to high humidity, including locker rooms, shower rooms, and kitchen. Trim shapes shall be RP-2, RP-4, and RP-46, as manufactured by USG, or Architect approved equal.
PART 3 - EXECUTION

3.01 INSPECTION

A. The Installer/Erector shall examine substrates, supports, and conditions under which this Work is to be performed and notify General Contractor, in writing, of conditions detrimental to the proper completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected. Beginning Work means Installer accepts substrates and conditions.

3.02 INSTALLATION OF GYPSUM BOARD AND RELATED PRODUCTS

A. Strictly comply with the approved manufacturers written instructions and recommendations, except where more restrictive requirements are specified in this Section.

B. Framing:
   1. Install and erect framing in accordance with requirements of ASTM C 754. Provide framing to comply with published details and recommendations of the approved manufacturer, and the Gypsum Construction Handbook, as published by USG.
      a. Framing shall not bridge building construction or control joints; frame separately on both sides and allow for movement.
      b. Isolate framing system from structural loading both horizontally and vertically.
      c. Provide slip or cushioned joints at top of walls. Maintain lateral stability and acoustical performance.
      d. All partitions, including framing and wallboard, shall be terminated at structural deck above, except as noted otherwise.
      e. Space framing members at 16 in. o. c., unless indicated otherwise, or as otherwise required to meet specified deflection requirements.
      f. Cut metal studs 1/2 in. short of top track.

C. Secure ceiling framing to structure above using hangers and fasteners capable of supporting at least 3 times actual loads.

D. Installation of gypsum board and all related materials shall be in strict compliance with requirements of ASTM C 840 and Gypsum Association publication No. 216, *Recommended Specifications for the Application and Finishing of Gypsum Board*, and the following:
   1. Locate joints between boards as far from center of walls and ceilings as possible
   2. Stagger vertical joints on opposite sides of walls and in multiple layer Work
   3. Install gypsum and related board materials with face side out and with joints over framing members
   4. Do not butt dissimilar board edges
   5. Cover both faces of stud partitions, except at chase walls
   6. Attach boards to framing with self-tapping, bugle head screws or fasteners recommended by manufacturer
   7. Space fasteners as recommended by manufacturer
   8. Install drywall ceilings prior to gypsum board walls
      a. Provide two layers of gypsum board at selected ceilings as indicated on the Drawings for sound reduction.
   9. Provide water, mold, and mildew resistant interior wall panels at all Toilet Rooms and Locker Rooms
   10. Provide abuse resistant panels at all interior gypsum board partitions, as indicated on the Drawings
   11. Provide water and mold resistant exterior wall sheathing panels at all exterior wall assemblies, soffits and overhangs as called for on the Drawings
   12. In multiple layer walls, provide backing board or multiple layers of face board
   13. Form control joints by preparing space between edges to receive metal control joint trim
   14. Do not use tapered edges at doors, windows, or casing beads

E. Provide all additional supplemental framing at openings in walls and ceilings as may be required to comply with written requirements of the approved manufacturer, and the *Gypsum Construction Handbook*, as published by USG.
F. Fiberglass insulation at interior locations shall be friction fit into spaces between metal studs, including wall cavities and soffits, and other voids. Fit insulation closely around openings and penetrations. Provide supplemental stick-clips as needed to hold insulation in cavities and prevent falling.

G. Provide continuous bead of acoustical sealant at both faces of bottom runners, perimeters, openings, expansion and control joints. Close off all sound flanking paths and openings, including those above ceilings.
   1. Installation of acoustical insulation and sealant to seal tightly and completely around penetrating objects through non-fire rated gypsum drywall, including but not limited to, HVAC duct, fire protection piping, and electrical conduit, shall be provided under the Work of Section 07 92 00 – Joint Sealants.

H. Strictly comply with manufacturer’s instructions and recommendations for installation of metal trims and accessories. Meet installation tolerance requirements.
   1. Provide corner bead trim at all external corners. Provide joint reinforcing tape at all internal corners.
   2. Provide control joints where shown, or not less than 30 ft. O.C., at locations approved by the Architect.
   3. Provide edge trim wherever edge of gypsum board is exposed, revealed, sealant filled, abutting dissimilar materials.
   4. Provide galvanized trim accessories at all Toilets.

I. Provide 3 coats joint compound treatment at all joints, flanges of trim accessories, penetrations, fastener heads and surface defects. Provide Level 4 finish at all interior areas to receive gypsum wall panels, and prior to application of primer/surfacer at locations of abuse resistant gypsum wall panels.
   1. Extend joint finishing to floor behind wall base to provide a smooth flat surface for installation of wall base.
   2. For water-resistant board applications, use special water-resistant joint compound to seal joints, cover fastener heads, fill surface defects and seal cut edges.

J. Fully grout metal door frames located in metal stud partitions that are rated wall assemblies. Mix grout to a thick, workable mix and completely fill heads and jambs. Rake out joints along back bend of door frame to depth of back edge of anchors. Width of raked joint shall be of sufficient size so that gypsum panels can be installed behind back bend of frame. Provide a fully grouted frame on site, which shall act as a prototype for the installation of all frames for the project. Such a prototype shall be approved by the Architect prior to the installation of any door frames in metal stud partitions.

3.03 TOLERANCES
A. The following installed tolerances for gypsum drywall are allowable variations from locations and dimensions indicated by the Contract Documents and shall not be added to allowable tolerances indicated for other Work.
   1. Allowable Variation from True Plumb, Level, & Line: ± 1/8 in. in 20 ft.-0 in.

B. After finishing joints and screw heads shall be flush and invisible. Surfaces shall appear flush, smooth, seamless and uniform. Planes shall be flat. Corners shall be crisp and at true angles. Where gypsum drywall butt dissimilar materials, joints shall be tight and shall be accurately scribed to adjacent construction without gaps.

3.04 ADJUSTING, CLEANING, AND PROTECTION
A. Cut, patch, repair and point Work as needed to accommodate other Work and to repair cracks and defective surfaces. Eliminate blisters, check cracking, dried out spots and all other defects and problem areas. Repair minor damage to eliminate all evidence of repair. Leave Work including trims and accessories ready for finishing.

B. Clean adjacent surfaces using non-abrasive materials and methods to make adjacent Work in “as-found” condition, undamaged by plaster operations. Remove and replace Work that cannot be successfully cleaned or repaired.

C. Provide temporary protection to ensure completed Work is without damage or deterioration at time of final acceptance. Remove protections and re-clean as necessary immediately before final acceptance.
3.05 RUBBISH REMOVAL

A. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.
SECTION 09 91 13

PAINTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

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

1.02 DESCRIPTION OF WORK

A. The Work of this Section includes, but is not limited to, preparation, painting and finishing of all exposed interior and exterior surfaces including existing exterior windows (interior and exterior window frame), except the following:

1. Factory finished items
2. Finished metal surfaces of stainless steel, copper, brass, bronze, and aluminum
3. Finished metal surfaces that are plated such as finished hardware
4. Surfaces in concealed areas such as crawl spaces, above ceilings, and the like
5. Moving parts, code required labels, and equipment data plates
6. Mechanical and electrical items not in public spaces
7. Acoustical ceiling systems
8. Finished masonry surfaces such as face brick, glazed block, ceramic tile, and the like.
9. Testing for VOC compliance

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section include, but are not limited to, the following:

1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
2. Section 02 41 13 – Selective Demolition
3. DIVISION 03 – CONCRETE; including all Sections contained therein
4. DIVISION 04 – MASONRY; including all Sections contained therein
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein.
7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
9. DIVISION 09 – FINISHES; including all Sections contained therein.
10. Section 21 00 00 – Fire Suppression
11. Section 22 00 00 – Plumbing
12. Section 23 00 00 - HVAC
13. Section 26 00 00 – Electrical
14. DIVISION 31 – EARTHWORK; including all Sections contained therein
15. Section 32 12 00 – Site Improvements
1.04 QUALITY ASSURANCE
   A. All materials, including primers, other undercoat paint, and finish paint shall be produced by a single manufacturer. Use thinners and other accessory materials acceptable to the approved paint manufacturer, and use only within the approved manufacturer’s recommended limits.
   B. Review other Sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure that compatible coats are used.
   C. Before beginning primary Work of this Section, provide 100 square foot mock-ups of each color and paint system at locations acceptable to Architect and obtain Architect's acceptance of visual qualities. Protect and maintain acceptable mock-ups throughout the Work of this Section to serve as criteria for acceptance of this Work. Acceptable mock-ups may be incorporated into the finished Work.

1.05 TESTS
   A. The Owner may employ an independent testing agency to perform tests, evaluations and certifications. Cooperate and permit samples of materials to be taken as they are used. The Painting Subcontractor shall pay all costs associated with tests demonstrating failure of the tested material to comply with requirements of the Contract Documents.

1.06 SUBMITTALS
   A. Submit list of all materials proposed for use, indicating:
      1. Manufacturer
      2. Product name
      3. Surface for which proposed
   B. Submit color swatches showing complete range of colors and finishes available for each paint and finish system.
   C. Before painting mock-ups, submit representative samples of each material that is to be exposed in the finished Work, showing the full range of color and finish variations expected. Prepare paint samples on gypsum drywall or poster board and make samples not less than 12 inches square. On actual wood surfaces provide 4 in. x 8 in. samples of each natural and stained wood finish.

1.07 DELIVERY, STORAGE AND HANDLING
   A. Deliver materials and products in unopened, factory labeled packages. Store and handle in strict compliance with the approved manufacturers’ written instructions, and protect from freezing and damage.
   B. Avoid the possibility of fire by removing flammable materials, solvents and spirits from the project site or by storing materials in UL approved fire-resistive cabinets. Keep Work area free from flammable waste and soiled rags.

1.08 PROJECT CONDITIONS
   A. Perform Work only when existing and forecasted conditions are within the limits established by the approved manufacturer of the materials and products used.
      1. Apply water-based paints only when temperature of surfaces to be painted and surrounding air temperatures are between 50°F and 90°F, unless otherwise permitted by manufacturer's printed instructions.
      2. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air temperatures are between 45°F and 95°F, unless otherwise permitted by paint manufacturer's printed instructions.
      3. Do not apply paint in snow, rain, fog or mist, or when relative humidity exceeds 85%, or to damp or wet surfaces, unless otherwise permitted by paint manufacturer's printed instructions. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer during application and drying periods.
B. The Painting Subcontractor shall examine substrates, supports, and conditions under which this Work is to be performed and notify General Contractor, in writing, of conditions detrimental to the proper completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected. Beginning Work means Installer accepts substrates and conditions.

C. Comply with the approved manufacturer's requirements and recommendations for area ventilation.

D. Perform Work only when permanent lighting system is operational and in use. If not in use provide temporary lighting that simulates as closely as possible permanent lighting system.

E. Cover or otherwise protect finished Work of other trades.

1.09 EXTRA MATERIAL

A. Provide maintenance stock in the approved manufacturer’s new, unopened containers equal to 5% of the actual quantity installed. Provide a minimum of two, five-gallon containers of each wall color and two, one-gallon containers of each trim color.

1.10 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

B. Coordinate the Work of this Section with Work specified in other Sections. Furnish information on finish materials to be used in the field to ensure that correct prime coats are used in the shop.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Materials shall be first line products of one of the following manufacturers, approved by the Architect:

1. Conventional Paint Finishes:
   a. Sherwin-Williams
   b. Benjamin Moore
   c. California Paints

2. Specialty Paint Finishes
   a. Sherwin Williams
   b. DuPont
   c. Albi Manufacturing

3. Colored Concrete Sealer
   a. Scofield
   b. Benjamin Moore
   c. Sherwin-Williams

2.02 MATERIALS

A. Products specified are as manufactured by Sherwin Williams, unless otherwise indicated. Similar products of acceptable manufacturers listed in Paragraph 2.01 may be furnished in lieu of those listed, approved by the Architect.

1. Provide primary products of the system from the products of a single manufacturer.

2. Products not specified by name and required for the job, such as shellac, thinners, putty, shall be "best grade" or "first Line" products of a reputable manufacturer and acceptable to the approved manufacturer of the paint coatings.
3. Colors shall be as selected by the Architect from the approved manufacturer’s complete selection of standard and premium colors. Public areas of the building shall be considered decorative and shall require the use of several colors, including but not limited to, deep tone, bright, and accent colors.
   a. Classrooms and offices shall be limited to one wall of accent color. Cafeteria, Library, Art Rooms, Music Room, Lobbies, and Corridors shall contain no more than three different wall colors and one trim color. Building wide, the Owner shall select no more than ten wall colors, five trim colors, and two structural steel, steel deck, ductwork, and mechanical system colors.
   b. Exposed structural steel, metal deck, plumbing piping, fire protection piping, and electrical conduit shall be painted one color. Exposed HVAC ductwork shall be painted one color. Colors shall be as selected by the Architect from the approved manufacturers’ complete selection of standard colors.

PART 3 - EXECUTION

3.01 INSPECTION AND PREPARATION
   A. The Installer shall be solely responsible for the finishing Work and shall prepare substrates as needed to obtain the highest quality finished surfaces.
   B. Strictly comply with the approved manufacturers’ written instructions, except where more restrictive requirements are specified in this Section.
   C. Clean surfaces in accordance with the approved manufacturer’s requirements for removal of dirt, oil, grease, mildew, asphalt, concrete splatters, and all other foreign substances. Do not finish over dirt, rust, grease, moisture and other conditions detrimental to formation of a durable finish film.
   D. Remove finish hardware, fixtures, accessories, and similar items, or tape and mask all surfaces not to be painted to protect these surfaces from damage or overpaint. Replace these items when finishing Work is completed.
   E. Remove incompatible primers and re-prime or provide barrier coats in compliance with the approved finish paint manufacturer’s written instructions.
   F. Prepare masonry and concrete materials by removing laitance, efflorescence, form release agents, and surface glaze by cleaning and washing as recommended by the approved finish paint manufacturer and approved by Architect. Brush surfaces to remove loose particles. Fill cracks and irregularities with Portland cement grout to provide uniform surface texture. Allow a minimum of 60 to 90 days curing time before finishing poured and pre-cast concrete. Allow a minimum of 30 to 60 days curing time before finishing concrete masonry. Determine substrate alkalinity and moisture content and, if necessary, take appropriate remedial actions as recommended by the approved finish paint manufacturer.
   G. Prepare all wood surfaces not indicated to be factory finished under the Work of Section 06 20 00 by sanding smooth, sealing knots, setting nails and fasteners, and filling holes, cracks, and imperfections with putty acceptable to the approved finish manufacturer. For transparent finished Work, use putty and filler color matched to wood to minimize its appearance. All interior and exterior woodwork shall be sealed and back primed immediately after delivery to site and before installation.
   H. Prepare shop primed, ferrous metal surfaces by solvent wiping, sanding and touching-up shop prime coats. Prepare bare metal surfaces by power tool cleaning in accordance with SSPC SP 3 requirements. Remove rust, welding flux and splatter, burrs, and all other surface defects and foreign substances. Clean surfaces by washing with water followed by phosphate rinsing. Apply prime coats immediately after completion of cleaning.
   I. Aggressively clean new galvanized surfaces with grease cutting solvent, such as mineral spirits, to remove fabricating oils. After cleaning provide a SSPC SP 7 brush off blast of galvanized steel surfaces to create a 2mil profile for paint adherence. Touch-up abraded surfaces immediately with zinc-rich paint having a minimum dry film content of 95% by weight, Galvilite Galvanizing Repair Compound, as manufactured by ZRC, or Architect approved equal.
   J. Solvent clean aluminum surfaces in accordance with SSPC SP 1 requirements.
   K. Finish tops, bottoms, and edges of all doors the same as door faces.
L. Clean gypsum drywall surfaces as to make free of dust and foreign substances. Joint treatment materials shall be thoroughly dry. Paint metal corner beads and trim with metal primer before application of water based finish coatings.

M. Ducts visible through supply and return grilles shall be painted flat black.

3.02 APPLICATION

A. Strictly comply with the approved manufacturers' written instructions, except where more restrictive requirements are specified in this Section.

B. Mix and prepare materials in strict compliance with the approved manufacturers' written instructions. Do not thin materials without Architect's approval. Keep foreign substances out of finishing materials.

C. Provide primers as recommended by the approved finish paint manufacturer for substrates encountered. Tint all primers and undercoats to the approximate shade of the finish coat, making each coat slightly darker and closer to the finished shade. Use deep base primers for deep tone, bright, and accent colors. Prime surfaces immediately after surface preparation to prevent contamination of substrate.

D. Apply finish materials at the lowest coverage rate and the highest dry film thickness recommended by the approved manufacturer. Provide additional coats as needed to eliminate all show through and bleed through areas.

   1. Spray application of paint and finish systems is acceptable for CMU, gypsum drywall, metal doors and frames, interior steel roof decks, structural steel joists, HVAC ducts, and mechanical piping, where Painting Subcontractor can demonstrate adequate control of overspray, control of coats, and has first obtained Architect's written permission. CMU and gypsum drywall shall be rolled following spray application of paint to provide a dense, uniform appearance. Provide uniform final finishes, free of runs, sags, wrinkles, streaks, shiners, brush/roller marks, color variations and other imperfections.

E. Finish interior of HVAC ductwork behind louvers and grilles, when these surfaces are visible, with flat black paint. Wall surfaces located behind wall mounted markerboards and tack boards shall be painted. Painting of surfaces located behind metal corridor lockers and pre-manufactured casework is not required.

F. Fine sand all painted woodwork and painted metal between coats in accordance with the approved manufacturers' written instructions.

G. Allow the required waiting period between successive coats in accordance with the approved manufacturer's written instructions.

H. Provide final finishes which exactly match Architect approved mock-ups.

3.03 TOUCH UP, CLEANING, AND PROTECTION

A. Touch up damaged coatings and finishes to eliminate evidence of repair.

B. Clean finished surfaces and remove all finish splatters from adjacent Work. Remove and replace Work that cannot be successfully cleaned.

C. Provide signs and temporary protection to ensure Work being without damage or deterioration at time of final acceptance. Remove protections and re-clean as necessary immediately before final acceptance.

3.04 RUBBISH REMOVAL

A. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.
3.05 FINISH PAINTING SCHEDULE

A. The following finish systems refer to products of Sherwin Williams, unless indicated otherwise. Provide these systems or comparable systems from any specified manufacturer, approved by the Architect.

1. INTERIOR FERROUS METAL
   Primer: Sherwin Williams Pro-Cryl Primer, B66 Series
   Finish Coat 1: Sherwin Williams ProMar 200 Zero VOC Interior Latex Semi-Gloss B31
   Finish Coat 2: Sherwin Williams ProMar 200 Zero VOC Interior Latex Semi-Gloss B31

2. EXTERIOR FERROUS METAL
   Primer: Sherwin Williams Pro-Cryl Primer B66 Series
   Finish Coat 1: Sherwin Williams Pro Industrial DTM Satin B66
   Finish Coat 2: Sherwin Williams Pro Industrial DTM Satin NB66
   
   Note 1: Where rust has formed, scrape, sand and provide one coat of IMC Rust Converter M 82, prior to application of primer

3. EXTERIOR FERROUS METAL - GALVANIZED
   Primer: Sherwin Williams Pro-Cryl Primer, B66 Series
   Finish Coat 1: Sherwin Williams Pro Industrial DTM Satin B66
   Finish Coat 2: Sherwin Williams Pro Industrial DTM Satin NB66

4. INTERIOR WOOD - PAINTED
   Primer: Sherwin Williams ProMar 200 Zero VOC Primer B28
   Finish Coat 1: Sherwin Williams ProMar 200 Zero VOC Interior Latex Eq-Shel B20
   Finish Coat 2: Sherwin Williams ProMar 200 Zero VOC Interior Latex Eq-Shel B20

5. INTERIOR DRYWALL
   Primer: Sherwin Williams ProMar 200 Zero VOC Primer, B28
   Finish Coat 1: Sherwin Williams ProMar 200 Zero VOC Interior Latex Eq-Shel B20
   Finish Coat 2: Sherwin Williams ProMar 200 Zero VOC Interior Latex Eq-Shel B20

6. INTERIOR CONCRETE - PAINTED
   Primer: Sherwin Williams Loxon Concrete Masonry Primer A24
   Finish Coat 1: Sherwin-Williams Pro Industrial Water Based Epoxy B73

7. INTERIOR CONCRETE - SEALED
   COLORCURE Concrete Curing Compound and Sealer, as manufactured by Scofield or Architect approved equal by Benjamin Moore or Sherwin-Williams. Color to be grey

8. INTERIOR CMU
   Primer: Sherwin Williams Pro Industrial Heavy Duty Block Filler, B42W00150
   Finish Coat 1: Sherwin Williams Pro Industrial Water Based Epoxy B73
   Finish Coat 2: Sherwin Williams Pro Industrial Water Based Epoxy B73

9. EXTERIOR CMU
   Primer: Sherwin Williams Loxon Concrete Primer, A24W8300
   Finish Coat 1: Sherwin Williams Superpaint Satin A89W1151
   Finish Coat 2: Sherwin Williams Superpaint Satin A89W1151

B. SPECIALTY PAINT FINISHES

The following finish systems refer to products of California Paints, Benjamin Moore, and Tnemec unless indicated otherwise. Provide these systems or comparable systems for any specified manufacturer, approved by the Architect.

1. OVERHEAD EXPOSED STRUCTURAL STEEL AND INTERIOR STEEL ROOF DECK
   NOTE: Primary surface preparation: Self-priming, test patch recommended on galvanized ceiling deck to check for presence of factory-applied stabilizers.
   a. Rust and other surface contaminant shall be removed from ferrous metals, aluminum, copper, brass, and galvanized steel. The surface shall be thoroughly cleaned in accordance with the approved manufacturer’s written preparation method.
b. Additional Prep for Galvanized Steel: Caution must be used when selecting coatings for use on all galvanized metal surfaces. These substrates may have a factory-applied stabilizer, which is used to prevent white rusting during storage and shipping. Such stabilizers must be removed by either brush blasting or chemical treatment applied directly to properly prepared galvanized steel, with the exception of areas that are subjected to high humidity.

2. GALVANIZED STEEL AND METAL FINAL COATINGS
   a. Sherwin Williams: Pro Industrial Waterborne Acrylic Dryfall White 15-2.5 mils DFT
   b. California Paints: Latex Flat Dryfall No. 3701
   c. Benjamin Moore: M53 Sweep-up Spray Flat Latex, 1.5 – 2.5 mils DFT
   d. Tnemec: Uni-bond 115 DF Acrylic Dryfall, 2- 4 mils DFT

END OF SECTION
PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Include General Conditions and applicable parts of Division 1 as part of this Section.

B. Examine all other Sections of the Specifications for any Requirements that affect Work of this Section, whether or not such Work is specifically mentioned in this Section.

C. Coordinate Work with that of all other Trades affecting, or affected by, Work of this Section. Cooperate with such Trades to assure the steady progress of all Work under the Contract.

1.02 SCOPE OF WORK

A. Work in this Section includes all labor, materials, equipment, and services necessary to furnish completely and install a Fire Suppression System as specified herein and in general as follows:

1. Disconnect, make safe, cut and cap, and demolish existing equipment, piping and appurtenances as may be required to accommodate the new work. This Contractor shall be responsible for removal and disposal of all debris generated by the demolition of the fire sprinkler system.

2. Modifications to the existing fire sprinkler systems as indicated and as may be required to accommodate the new construction.

3. Hydrant flow test.

4. Working Plans and supporting hydraulic calculations for the Fire Suppression System. Plans and calculations shall be stamped by a Registered Fire Protection Engineer, if required by the Authority Having Jurisdiction.

5. Pipe, fittings, hangers, seismic bracing, sprinklers and other incidental items. Remove all identifying labels, tags, and maskings that will interfere with painting (except UL, FM, nameplates, etc.)

6. Coring, cutting, and patching of all penetrations to install sprinkler piping. Coring and cutting shall be performed using dust reduction and collection techniques which will collect dust and debris before settling on building surfaces.

7. All signage, valve tags and pipe identification associated with the sprinkler system.

8. Coordination with all other Trades.

9. Flushing and testing.

10. Operating instructions, maintenance manuals, and Record Drawings.

11. Obtain and pay for all inspections, licenses, permits, and approvals required by Governing Authorities and install all work in compliance thereof.

B. The Work of this Section is shown on Drawing FP1.01.
C. Examine all Project Documents for any Requirements that affect the Work of this Section, whether or not such Work is specifically mentioned in this Section.

1.03 RELATED WORK UNDER OTHER SECTIONS

A. The following Work is not included in this Section but is to be performed by other Trades as specified within the other Sections.

1. Firestopping of fire-rated assembly through penetrations.

2. Painting of piping, fittings, coverings, hangers, supports, and all equipment not specifically specified to be painted by this Contractor.

1.04 INTENT

A. All Work shall be in accordance with the arrangement, details, and locations, as indicated on the Contract Drawings, Reference Drawings and any supplemental Addenda, Bulletins or Drawings issued by the Architect. Layouts are diagrammatic and final arrangement of equipment and piping shall suit field conditions. Install all necessary fittings and equipment offsets required to meet job conditions. Work installed in a manner contrary to that shown on the Drawings, or interfering with the Work of another Trade, shall be removed and reinstalled when so directed by the Architect. Discrepancies and questionable points shall be immediately reported to the Architect for clarification.

1.05 CODES, REGULATIONS, AND STANDARDS

A. All Work shall be installed in compliance with the governing Codes, Regulations, and Ordinances. It shall be the responsibility of this Contractor to familiarize himself with all governing Codes, Regulations, and Ordinances and report any non-compliance of the Plans and Specifications to the Architect, prior to entering into a Contract. All above Requirements shall take precedence over the Plans and Specifications. These Requirements are minimum criteria and no reductions to the quality or capacity of the Systems that may be permitted by Code will be allowed without written permission of the Architect.

B. All workmanship, methods, and materials shall meet the highest standards of the Trade and, in general, shall conform to the standards of the following associations:

- American Standards Association (ASA)
- American Society of Mechanical Engineers (ASME)
- National Board of Fire Underwriters (NBFU)
- Standard of Underwriters Laboratories (UL)
- American Society of Testing Materials (ASTM)
- National Electric Code - NFPA 70 (NEC)
- National Fire Protection Association (NFPA)
- Occupational Safety and Health Act (OSHA)
- American National Standards Institute (ANSI)
- Building Officials and Code Administrators (BOCA)
- American Society of Sanitary Engineering (ASSE)
- Society of Fire Protection Engineers (SFPE)
- Massachusetts State Building Code (780CMR)
- Massachusetts State Plumbing and Gas Codes (248CMR)
- New Bedford Building Regulations and Ordinances
- New Bedford Fire Department Requirements

C. Where the contract documents indicate more stringent requirements than the above codes and ordinances, the Contract Documents shall take precedence.
1.06 DRAWINGS AND CONFLICTS IN THE WORK

A. The Drawings and Specifications are intended to be complementary. Any materials shown or specified in one, but not in the other, reasonably implied and usually included under good industry practice and/or required by applicable Codes and Regulations for the proper and safe completion and operation of the Work described herein, shall be furnished and installed by this Contractor at no additional cost to the Owner. Drawings show general arrangement of equipment and are not intended to indicate the exact installation dimensions.

B. Any conflicts and/or non-compliance of the Plans and Specifications apparent at the time of the start of the project shall be brought to the attention of the Architect and/or Engineer prior to entering into a contract.

1.07 EXCHANGE OF INFORMATION AND COORDINATION

A. All Work covered by this Section of the Specifications shall not be installed without first coordinating the installation of same with all other Trades and the General Contractor. This Contractor shall, at his own expense, relocate any of his Work should it interfere with the proper installation and/or operation of the Work to be installed by other Trades and by the General Contractor.

B. Particular attention shall be directed to the coordination of this Work with all Work of other Trades which is to be installed in the ceiling areas. Coordinate, with all other Trades, the Work in suspended ceiling areas to insure adequate space for the installation of all Work of all Trades, prior to installation.

C. Coordination of this Work with all other Trades will require that this Contractor attend on-site coordination meetings and develop coordination Drawings so as to ensure that all Trades will be provided with adequate space to install their Work.

D. Furnish to the General Contractor, and all other Contractors, all information relative to the Work of this Section that will affect them, sufficiently in advance, so that they may plan their Work and installation accordingly. This information shall include, but not be limited to, required clearances from sprinklers so as not to create obstructions to sprinkler discharge and/or pattern development, clearances from heat sources, cutting and patching, coring, electrical requirements, etc.

E. In the case of failure on the part of this Contractor to provide proper information, as indicated above, sufficiently in advance, this Contractor will pay for all back-charges incurred by the General Contractor and other Contractors for the modification and/or relocation of any portion of their Work already performed in conjunction with this Contract due to this Contractor's delay or for having given incorrect information.

F. Obtain from all other Trades all information relative to the Work covered by this Section of the Specifications, which this Contractor is to execute in conjunction with the installation of the Work of the other Trade(s).

G. In the event that conflicts, if any, cannot be settled rapidly and amicably between the affected Trades, with the Work proceeding in a skillful and competent manner, the Architect shall decide which Work is to be relocated and his judgment shall be final and binding.

1.08 WORKMANSHIP

A. The entire Work provided in this Specification shall be constructed and finished, in every respect, in a skillful, competent, and substantial manner. It is not intended that the Drawings shall show every component, pipe, and detail, but this Contractor shall furnish and install all such parts as may be necessary to complete the Work in accordance with governing Codes and Regulations, the best Trade practices, and to the satisfaction of the Architect, Engineer and the Owner, at no additional cost to the Owner.

1.09 SITE INVESTIGATION
A. It shall be the responsibility of the Bidders to acquaint themselves with the available information, before submitting their Bid. Bidders must visit the site and acquaint themselves with the existing conditions and shall study all Architectural, Structural, Mechanical and Electrical Drawings, as well as the Specifications. The Bidders shall fully inform themselves of all local and state Code Requirements. Bidders must report any conflicts and/or non-compliance of the construction documents to the Architect for review prior to submitting their bid.

1.10 TAXES AND INSURANCE

A. This Contractor shall include in his Bid, applicable federal, state and local taxes and the premiums of the insurance required by the General Conditions and Supplementary General Conditions of the Contract.

1.11 PERMITS AND INSPECTIONS

A. This Contractor shall obtain and pay for all the permits required for this Section of the Work. He shall also obtain and pay for all the inspections and tests required. Defects discovered in Work, materials, and/or equipment shall be replaced at no cost to the Owner, and the inspection and test shall be repeated until no defects are discovered.

1.12 CONTRACT COST BREAKDOWN

A. At the start of construction, submit a breakdown of material and labor costs to aid the Architect in determining the value of the Work installed, as the job progresses. The cost breakdown shall itemize categories of materials or portions of Systems, as may be the case, to place a value on the Work as it is installed.

B. No requisitions will be paid until after the breakdown is delivered to the Architect.

1.13 GUARANTEE

A. Unless otherwise noted, all materials, items of equipment and workmanship furnished under this Section shall carry the standard warranty against all defects in material and workmanship for a period of not less than one (1) year from the date of final acceptance of the Work. Any fault due to defective or improper material or workmanship which may develop within that period, shall be made good, forthwith, by and at the expense of this Contractor, including all other damage done to areas, materials and other Systems resulting from this failure.

B. This Contractor shall guarantee that all elements of the Systems are of sufficient capacity to meet the specified performance Requirements as set forth herein or as indicated.

C. Upon receipt of notice from the Owner of failure of any part of the Systems during the guarantee period, the affected part or parts shall be promptly replaced by this Contractor, at no charge to the Owner.

D. Before the final payment is made, this Contractor shall furnish a written guarantee covering the above Requirements.

1.14 MATERIALS

A. Materials shall be the best of their respective kinds and in full accord with the most modern mechanical construction. All materials shall be new.

B. All materials necessary to make the installation complete in every detail shall be furnished and installed under this Contract, whether or not specifically shown on the Drawings or specified herein.

C. It is the intent of the Specifications that one manufacturer be selected, not a combination, for any particular classification of materials.
D. Where materials, equipment apparatus, or other products are specified by manufacturer, brand name, type or catalog number, such designation is to establish the standard of desired quality and style and shall be the basis of the Bid.

1.15 MATERIALS AND EQUIPMENT HANDLING

A. This Contractor shall do all handling of his materials and equipment and the resulting cleanup, at his expense, in a safe and a satisfactory manner. Special attention shall be paid to the protection of life and property and the equipment or apparatus handled, and any corresponding damages shall be replaced, repaired, or paid for by this Contractor, as approved by the Architect. This Contractor shall provide all rigging, hoisting, and staging required to complete the Work of this Section, unless specifically noted otherwise.

1.16 MAINTENANCE AND PROTECTION OF MATERIALS

A. This Contractor shall be responsible for the maintenance and protection, from loss or damage of all causes, of all equipment, materials, and tools supplied by him and stored or installed on the job site, until final acceptance of the Project by the Owner.

B. This Contractor shall store his materials and equipment in the location designated by the Owner and maintain the storage area in a clean and safe condition.

C. This Contractor, at his own expense, shall clean, patch and repair any material and finishes of the building or its contents damaged during the execution of this Contract. Patches and repairs shall be performed by Trades specializing in the specific surfaces affected.

1.17 SUBMITTALS

A. Submit complete Shop Drawings on all materials and equipment intended to be used in the construction of the Systems in accordance with provisions of Section 01 33 00, Submittals, and Record Documents.

B. The approval of equipment and materials does not relieve this Contractor from the responsibility of Shop Drawing errors in details, sizes, quantities, and dimensions which deviate from the Specifications, Contract Drawings, and/or job conditions, as they exist.

C. If apparatus or materials are submitted by this Contractor for those specified and such substitution necessitates changes in any mechanical or electrical equipment, or alteration to connections, piping supports, or construction, same shall be provided by this Contractor at no additional cost to the Owner.

D. The Architect's permission to make substitutions shall not relieve this Contractor from full responsibility for the Work.

E. Changes to Work already performed, made necessary by delays in Shop Drawing approval, are the responsibility of this Contractor.

F. Availability of Record Drawings shall be a prerequisite to scheduling a final inspection of this Work and said Drawings and Original Contract Documents will be used in checking completion of the Work.

G. Non-availability of Record Drawings or inaccuracies therein may be ground for cancellation and postponement of any scheduled final inspection of the Work until such time as the discrepancy has been corrected.

1.18 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS

A. Provide operating instructions to the Owner's designated representative, with respect to operating and maintenance procedures, for all equipment and Systems installed under this Section. Operating instructions shall be given by the
manufacturers’ representatives. The cost of such instruction, up to a full four (4) hours, shall be included in the Contract price.

B. At the completion of the Project, turn over to the Architect two (2) complete Maintenance Manuals containing the following, as applicable:

2. Copy of fully executed permit(s).
3. Hard copy of approved As-Built Drawings.
4. DVD of approved As-Built Drawings in PDF and AutoCad format.
5. Copy of approved Narrative Report
6. Complete approved submittals of all materials and equipment installed.
7. Names, addresses and telephone numbers of all suppliers of the materials and equipment.
8. Warrantees on all equipment.
10. Spare parts list of all equipment and System components.
11. Spare parts kits as may be required by governing Codes, Regulations, and Ordinances. (i.e. backflow preventer per 310CMR Section 22.22(4)(c)).
12. Above and below ground test certificates.
15. Fire pump test certificate.
16. Other documentation of permits, inspections, tests, etc. as applicable.

C. Each manual shall be typewritten and bound under a separate hard cover 3-ring binder and will be reviewed by the Architect. The manuals shall be clearly and permanently identified on the cover and binding with the name of the Project.

D. Refer to Section 01 77 00, Project Closeout, for general provisions covering Project closeout procedures.

1.19 CLEANING SYSTEMS

A. Before the Systems are accepted, all equipment shall be thoroughly cleaned to remove all dust, dirt and/or other foreign matter.

B. After the installation is complete, equipment with factory-finished surfaces shall be cleaned and damaged or scratched spots shall be touched up with the same type and color paint applied at the factory.
C. All equipment that is to receive finish paint by the Painting Contractor shall be cleaned by this Contractor and left ready to have surfaces prepared to receive paint.

1.20 RUBBISH REMOVAL

A. At the completion of the Work, or when ordered by the General Contractor or the Architect, this Contractor shall remove from the property, all the rubbish and waste materials belonging to him. Keep the job site free from the accumulation of waste materials and rubbish; premises must be maintained in a clean condition.

1.21 TEMPORARY STRUCTURES

A. This Contractor shall provide, on the premises and where directed by the Architect, shall maintain in good condition, and shall remove when directed, suitable and substantial watertight sheds in which he shall store all his materials and equipment.

1.22 TEMPORARY SERVICES

A. All water, electricity, fire protection and sanitary facilities required for safe and efficient construction during normal working hours shall be furnished in accordance with the General Requirements and Supplementary General Requirements.

1.23 TESTS

A. Furnish all labor, materials, instruments, supplies, and services and bear all cost for the accomplishment of the tests herein specified or required by governing Authorities. Correct all defects appearing under test, repeat the tests until no defects are disclosed, and leave the equipment clean and ready for use.

B. Perform any tests, other than herein specified, which may be specified by legal authorities or by agencies to whose Requirements this Work is to conform.

C. Dispose of test water and wastes after tests are complete, in a manner satisfactory to the Architect and in accordance with governing Regulations.

D. This Contractor shall coordinate and facilitate all inspections and tests required by Codes or the Authorities Having Jurisdiction.

E. This Contractor shall provide necessary support for testing and adjustment of all alarm devices connected to the suppression system.

1.24 EQUIPMENT ACCESS REQUIREMENTS

A. All Work shall be installed so that all parts requiring inspection, operation, maintenance and repair are readily accessible. Minor deviations from the Drawings may be made to accomplish this, but changes of magnitude shall not be made prior to written approval from the Architect.

B. Furnish access panels as required to permit access for adjustment, removal and the replacement and servicing of all equipment, and all other items requiring maintenance and/or adjustment.

C. Access panels shall be installed by the General Contractor.

D. Coordinate the exact location of access panels in all finished spaces with the Architect.

1.25 INSTALLATION REQUIREMENTS
A. This Contractor shall comply with all the governing Codes, Regulations, and Ordinances of all legally constituted Authorities having jurisdiction over the whole or any part of the Work herein specified. Governing Codes and Regulations supplement this Specification and shall take precedence in any case of conflict.

B. All equipment and materials furnished in connection with the installation shall be new and shall be furnished and installed in accordance with these Specifications and the Manufacturer's requirements.

C. All piping that is to receive paint shall not have any identifying labels, tags, markings, etc. (except for UL, FM, and code required nameplates) which would interfere with the preparation and painting of the surfaces.

D. All piping shall be installed concentrically within any floor, ceiling or wall penetration so as to allow for proper sealing of the penetration while maintaining the sealant flush with the adjoining surfaces.

1.26 WIRING DIAGRAMS

A. This Contractor shall provide to the General Contractor wiring diagrams for all equipment furnished under this Section for which wiring is to be installed by the Electrical Contractor.

PART 2 - PRODUCTS

2.01 PIPE AND FITTINGS

A. All piping inside the building for the Sprinkler System, two inches (2") and smaller in size, shall be Schedule 40 threaded black steel, conforming to ASTM Standards A53, A135, and/or A795 as applicable, and listed and approved for use in Fire Suppression Systems.

B. All Sprinkler System piping inside the building two and one-half inches (2½") and larger in size, unless otherwise noted, shall be Schedule 10 black steel pipe with rolled groove ends, conforming to ASTM Standards A53, A135 and/or A795 as applicable, and listed and approved for use in Fire Suppression Systems.

C. U.L. listed and F.M. approved groove fittings will be allowed. All fittings shall be approved by Underwriters' Laboratories for use in Sprinkler System and shall be designed and guaranteed for a working pressure of not less than 175-psi cold-water pressure.

D. All pipes shall be run true-to-line and grade and, in general, parallel to walls and ceilings.

E. All pipes, fittings, and couplings penetrating and/or installed at the building exterior, located in pipe tunnels, mechanical rooms, restrooms, basements and attics shall be galvanized.

2.02 HANGERS AND SUPPORTS

A. All piping shall be rigidly supported from the building structure by means of approved hangers and supports. Pipes shall be supported so as to maintain the required grading and pitching of lines, to prevent vibration and to secure piping in place; they shall be arranged so as to provide for proper expansion and contraction of pipe.

B. Where required, all piping and their attachments shall be designed for seismic forces as per the Requirements of the Massachusetts Building Code. It shall be the responsibility of this Contractor to provide all necessary calculations as required by the Building Code. One copy shall be submitted to the Engineer for his review, and one copy shall be submitted to the Structural Engineer for approval of attachments to the building structure.

C. Maximum spacing of hangers on horizontal runs of pipe shall be in accordance with NFPA 13.
D. Pipe hangers for all piping smaller than 4” shall be swivel ring band hangers. Pipe hangers for all piping 4” and larger shall be clevis type hangers. Riser clamps shall be of black malleable iron, in two (2) parts bolted together. All hangers and their attachments shall be of a type approved for Fire Suppression System installation.

E. All horizontal piping shall be suspended from the building structural elements by mild galvanized steel rod connecting the pipe hanger to inserts, angle brackets, lag screws, and spring isolators as required by the building construction and Code.

F. All piping installed under this Section of the Specifications shall be independently supported from the building structure and not from the ceilings, walls, piping, ductwork, or conduit of other Trades. All supplementary steel, including factory-fabricated channels required to meet the Requirements specified herein, shall be furnished and installed by this Contractor.

G. Unless noted otherwise, all hangers, rods, supports, channels, and accessories shall be galvanized.

H. This contractor shall furnish and install rod buttons or threaded escutcheons on all threaded rod penetrations of finished ceilings and/or walls.

I. Toggle bolts shall not be allowed.

2.03 DRAINS

A. Drains shall be provided at all low points of piping, at base of risers, and wherever necessary to ensure that all portions of the piping may be completely drained.

B. Sprinkler mains and branch lines shall be drained by pitch, installing drain valves where required, and sized per NFPA 13 requirements.

C. Drain draw off piping shall be provided and run to the building exterior as required. Splash blocks shall be furnished and installed at all drains.

D. Auxiliary drains shall not be required for trapped sections of less than 5 gallons where the system piping can be drained by removing a single pendent sprinkler.

E. All drain pipe terminations at the building exterior shall be galvanized.

2.04 TEST CONNECTIONS

A. Test connections shall be provided in accordance with NFPA requirements.

B. Test connections shall be of appropriate size and piped to the building exterior, whether or not shown on the Contract Drawings and/or unless noted otherwise on the Contract Drawings, terminating at a location so as not to cause damage or injury. Splash blocks shall be furnished and installed at all test connections terminating to grade.

C. Should the Contract Drawings indicate test connections terminating at an indirect waste receptacle, which is part of the Plumbing or Storm Drainage System, this Contractor shall verify that the receptacle is of sufficient size to accommodate the anticipated flow from the test connection.

D. This contractor shall provide the necessary support for testing and adjustment of all alarm devices connected to the sprinkler system.

2.05 SLEEVES AND INSERTS
A. All pipes passing through walls, floors, or partitions shall be provided with sleeves having an internal diameter one inch (1”) larger than outside diameter of the pipe.

B. Sleeves passing through floors, lightproof or soundproof walls and partitions, and through fire rated assemblies shall be made tight using approved caulking materials.

C. Sleeves shall be installed in new and/or existing building elements as required for the installation of through penetration firestop systems.

2.06 ESCUTCHEONS

A. Escutcheons shall be installed around all exposed bare pipe. Escutcheons shall be of sufficient outside diameters to cover the sleeve opening and shall fit snugly around the bare pipe.

B. Escutcheons shall be cast brass, gray primed finish and provided with a setscrew to properly hold escutcheons in place.

C. Escutcheons are permitted to be of metal or plastic construction with finish color if acceptable to the owner. Provide samples to the owner for approval prior to installation.

2.07 SPRINKLERS

A. All sprinklers shall be of a type as indicated on the drawings and shall have discharge characteristics as per NFPA 13. Sprinklers shall be U.L. Listed and shall be rated for a maximum working pressure of 175 psi.

B. All sprinklers shall have a temperature rating as required by NFPA 13.

C. All sprinklers located less than 7'-0" above the finished floor shall be furnished with listed sprinkler guards to protect the sprinkler from accidental damage.

2.08 SPARE SPRINKLERS AND CABINETS

A. This Contractor shall furnish and install, where directed by the Architect, a metal cabinet containing spare sprinklers and wrenches.

B. The Cabinet shall have shelves for storing the spare sprinklers in an orderly manner. The shelf spaces shall be subdivided to segregate the sprinklers of each type and clearly identify them with approved markings. The cabinets shall have proper arrangement for hanging the wrenches.

C. Spare sprinklers shall be provided in quantities as required by NFPA 13, corresponding to the types and temperature ratings of those installed in the premises.

D. Wrenches shall be provided in a number so that there will always be a minimum of two (2) wrenches of each type required to remove any sprinkler on the premises.

PART 3 - EXECUTION

3.01 WORKING PLANS

A. Before commencement of any work, this Contractor shall prepare Working Plans stamped and signed by a registered Fire Protection Engineer, submit and obtain approval from the insuring agent and the Fire Department, then submit
approved plans for permit. (Refer to Section 1.02-A(4)). Provide one copy of the plans and equipment submittal to the Engineer.

B. Plans shall include all requirements of NFPA 13.

C. This Contractor shall be responsible to develop complete Hydraulic Calculations, stamped and signed by a registered Fire Protection Engineer, as per NFPA 13. Hydraulic calculations shall allow for a minimum of a 10% cushion between the system requirement of the most hydraulically demanding remote area and the supply pressure available at the required system flow rate. Provide one copy to the Engineer.

3.02 START-UP AND TESTING

A. Notify the Architect of all tests no less than 24 hours prior to scheduled test.

B. Drain all low points in the System, and place the entire System into working order.

C. Furnish all labor, equipment, materials, and tests necessary to place all equipment and Systems into operation, and obtain approval of the entire Fire Sprinkler System from the legal Authorities and Agencies to whose Requirements this Work is to conform.

D. All materials, including sprinklers and fittings shall be properly protected so as to prevent obstructions and damage.

E. Prior to system acceptance, all alarm devices shall be tested for proper installation, adjustment, and interaction.

F. Pressure testing, flow testing, and alarm device testing shall be performed by this Contractor and shall be witnessed by the Authority Having Jurisdiction. Test certificates shall be included in the operation and maintenance manual.

3.03 COORDINATION

A. The structure and its appurtenances, clearances and the related services, such as plumbing, heating, ventilation, and electric service, have been planned to be adequate and suitable for the installation of equipment specified under this Section. The Owner will not assume any increase in cost caused by differing Requirements peculiar to a particular make or type of equipment, and any such incidental cost shall be borne by this Contractor.

B. This Contractor shall be responsible for Work and equipment furnished and installed by him or his Subcontractor(s) until the completion and final acceptance of this Contract, and he shall replace any Work that may be damaged, lost, or stolen, without additional cost to the Owner.

C. Cutting and Patching - It shall be the duty of this Contractor to consult with and give to the General Contractor, the exact location and size of all openings and full information as to cutting and patching necessary for the same.

D. In the event this Contractor fails to provide sleeves, inserts, and templates or fails to notify other Contractors well in advance of his Requirement, he shall be responsible for paying for all cutting and patching made necessary by his failure to do so.

E. The location and method of attaching supports for plumbing equipment to the building structure shall be coordinated with the Architect and General Contractor prior to the installation of any equipment. This Contractor shall take necessary precautions to insure the building structure and components are not overstressed by the support of plumbing equipment.

F. In the event there is a conflict or inadequate space for the proper installation of plumbing Systems, this Contractor shall prepare a scaled ($\frac{1}{4}" = 1'-0" \text{ min.}$) composite sketch, showing the building structure and all equipment and items affecting the installation, to clearly identify the areas of conflict. This Contractor shall submit four (4) copies of the
sketch, along with a written explanation of the problem, to the Engineer for his review and determination on what action to take to resolve the conflict.

G. It shall be the duty of this Contractor to furnish full information to all Trades relative to the Work they are to do in connection with Work under this Section. This includes data for wiring, including wiring diagrams, equipment foundations, pipe connections, etc., furnished under other Sections.

3.04 PAINTING

A. This Contractor shall apply one coat of anti-rust primer and two coats of anti-rust flat black enamel to all steel support hangers and other steel or iron elements of the Sprinkler System, furnished and installed by him. Paint shall be omitted from all items with a galvanized finish.

B. All surfaces to be painted shall be free of dirt, scale, rust, grease, and oil. Paint shall be applied in accordance with the Manufacturer's Requirements.

C. This Contractor shall touch up, with spray paint, all scratched or damaged surfaces of equipment with factory finish. Spray paint shall be the same color and type as factory finish.

END OF SECTION
SECTION 22 00 00

PLUMBING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Include General Conditions and applicable parts of Division 1 as part of this Section.

B. Examine all other Sections of the Specifications for any Requirements that affect Work of this Section, whether or not such Work is specifically mentioned in this Section.

C. Coordinate Work with that of all other Trades affecting, or affected by, Work of this Section. Cooperate with such Trades to assure the steady progress of all Work under the Contract.

1.02 SCOPE OF WORK

A. Work in this Section includes all labor, materials, equipment and services necessary to furnish completely and install all Plumbing Systems as specified herein, and in general as follows:

1. Disconnect, make safe, cut and cap, and demolish existing equipment, piping and appurtenances as may be required to accommodate the new work. This Contractor shall be responsible for removal and disposal of all debris generated by the demolition of the plumbing systems.

2. Sanitary (soil, waste, and vent) drainage System.


4. Hot and cold-water distribution System, including, piping, valves, insulation and associated accessories.

5. Plumbing fixtures, floor drains and associated trim.


7. Venting of all gas-fired equipment, including equipment furnished and installed under other Sections of the Specification.

8. Coring, cutting, and patching of all penetrations to install plumbing piping. Coring and cutting shall be performed using dust reduction and collection techniques which will collect dust and debris before settling on building surfaces.

9. Piping Systems identification


11. Operating instructions, maintenance manuals, and Record Drawings.

12. Obtain and pay for all inspections, licenses, permits, and approvals required by Governing Authorities and install all work in compliance thereof.

B. The Work of this Section is shown on Drawing P1.01.
C. Examine all Project Documents for any Requirements that affect the Work of this Section, whether or not such Work is specifically mentioned in this Section.

1.03 RELATED WORK UNDER OTHER SECTIONS

A. The following Work is not included in this Section but is to be performed by other Trades as specified within the other Sections.
   1. Firestopping of fire-rated assembly through penetrations.
   2. Painting of piping, fittings, coverings, hangers, supports, and all equipment not specifically specified to be painted by this Contractor.
   3. Excavation and backfill.
   4. Storm drainage system.
   5. Flashing of all Plumbing System roof penetrations.

1.04 INTENT

A. All Work shall be in accordance with the arrangement, details, and locations, as indicated on the Contract Drawings, Reference Drawings and any supplemental Addenda, Bulletins or Drawings issued by the Architect. Layouts are diagrammatic and final arrangement of equipment and piping shall suit field conditions. Install all necessary fittings and equipment offsets required to meet job conditions. Work installed in a manner contrary to that shown on the Drawings, or interfering with the Work of another Trade, shall be removed and reinstalled when so directed by the Architect. Discrepancies and questionable points shall be immediately reported to the Architect for clarification.

1.05 CODES, REGULATIONS, AND STANDARDS

A. All Work shall be installed in compliance with the governing Codes, Regulations, and Ordinances. It shall be the responsibility of this Contractor to familiarize himself with all governing Codes, Regulations, and Ordinances and report any non-compliance of the Plans and Specifications to the Architect, prior to entering into a Contract. All above Requirements shall take precedence over the Plans and Specifications. These Requirements are minimum criteria and no reductions to the quality or capacity of the Systems that may be permitted by Code will be allowed without written permission of the Architect.

B. All workmanship, methods, and materials shall meet the highest standards of the Trade and, in general, shall conform to the standards of the following associations:
   - American Standards Association (ASA)
   - American Society of Mechanical Engineers (ASME)
   - National Board of Fire Underwriters (NBFU)
   - Standard of Underwriters Laboratories (UL)
   - American Society of Testing Materials (ASTM)
   - National Electric Code - NFPA 70 (NEC)
   - National Fire Protection Association (NFPA)
   - Occupational Safety and Health Act (OSHA)
   - American National Standards Institute (ANSI)
   - Building Officials and Code Administrators (BOCA)
   - American Society of Sanitary Engineering (ASSE)
   - American Society of Plumbing Engineers (ASPE)
   - Massachusetts State Building Code (780CMR)
C. Where the contract documents indicate more stringent requirements than the above codes and ordinances, the Contract Documents shall take precedence.

1.06 DRAWINGS AND CONFLICTS IN THE WORK

A. The Drawings and Specifications are intended to be complementary. Any materials shown or specified in one, but not in the other, reasonably implied and usually included under good industry practice and/or required by applicable Codes and Regulations for the proper and safe completion and operation of the Work described herein, shall be furnished and installed by this Contractor at no additional cost to the Owner. Drawings show general arrangement of equipment and are not intended to indicate the exact installation dimensions.

B. Any conflicts and/or non-compliance of the Plans and Specifications apparent at the time of the start of the project shall be brought to the attention of the Architect and/or Engineer prior to entering into a contract.

1.07 EXCHANGE OF INFORMATION AND COORDINATION

A. All Work covered by this Section of the Specifications shall not be installed without first coordinating the installation of same with all other Trades and the General Contractor. This Contractor shall, at his own expense, relocate any of his Work should it interfere with the proper installation and/or operation of the Work to be installed by other Trades and by the General Contractor.

B. Particular attention shall be directed to the coordination of this Work with all Work of other Trades which is to be installed in the ceiling areas. Coordinate, with all other Trades, the Work in suspended ceiling areas to insure adequate space for the installation of all Work of all Trades, prior to installation.

C. Coordination of this Work with all other Trades will require that this Contractor attend on-site coordination meetings and develop coordination Drawings so as to ensure that all Trades will be provided with adequate space to install their Work.

D. Furnish to the General Contractor, and all other Contractors, all information relative to the Work of this Section that will affect them, sufficiently in advance, so that they may plan their Work and installation accordingly.

E. In the case of failure on the part of this Contractor to provide proper information, as indicated above, sufficiently in advance, this Contractor will pay for all back-charges incurred by the General Contractor and other Contractors for the modification and/or relocation of any portion of their Work already performed in conjunction with this Contract due to this Contractor's delay or for having given incorrect information.

F. Obtain from all other Trades all information relative to the Work covered by this Section of the Specifications, which this Contractor is to execute in conjunction with the installation of the Work of the other Trade(s).

G. In the event that conflicts, if any, cannot be settled rapidly and amicably between the affected Trades, with the Work proceeding in a skillful and competent manner, the Architect shall decide which Work is to be relocated and his judgment shall be final and binding.

1.08 WORKMANSHIP

A. The entire Work provided in this Specification shall be constructed and finished, in every respect, in a skillful, competent, and substantial manner. It is not intended that the Drawings shall show every component, pipe, and detail, but this Contractor shall furnish and install all such parts as may be necessary to complete the Work in accordance with
governing Codes and Regulations, the best Trade practices, and to the satisfaction of the Architect, Engineer and the Owner, at no additional cost to the Owner.

1.09 SITE INVESTIGATION

A. It shall be the responsibility of the Bidders to acquaint themselves with the available information, before submitting their Bid. Bidders should visit the site and acquaint themselves with the existing conditions and shall study all Architectural, Structural, Mechanical and Electrical Drawings, as well as the Specifications. The Bidders shall fully inform themselves of all local and state Code Requirements. Bidders must report any conflicts and/or non-compliance of the construction documents to the Architect for review prior to submitting their bid.

1.10 TAXES AND INSURANCE

A. This Contractor shall include in his Bid, applicable federal, state and local taxes and the premiums of the insurance required by the General Conditions and Supplementary General Conditions of the Contract.

1.11 PERMITS AND INSPECTIONS

A. This Contractor shall obtain and pay for all the permits required for this Section of the Work. He shall also obtain and pay for all the inspections and tests required. Defects discovered in Work, materials, and/or equipment shall be replaced at no cost to the Owner, and the inspection and test shall be repeated until no defects are discovered.

1.12 CONTRACT COST BREAKDOWN

A. At the start of construction, submit a breakdown of material and labor costs to aid the Architect in determining the value of the Work installed, as the job progresses. The cost breakdown shall itemize categories of materials or portions of Systems, as may be the case, to place a value on the Work as it is installed.

B. No requisitions will be paid until after the breakdown is approved by the Architect.

1.13 GUARANTEE

A. Unless otherwise noted, all materials, items of equipment and workmanship furnished under this Section shall carry the standard warranty against all defects in material and workmanship for a period of not less than one (1) year from the date of final acceptance of the Work. Any fault due to defective or improper material or workmanship which may develop within that period, shall be made good, forthwith, by and at the expense of this Contractor, including all other damage done to areas, materials and other Systems resulting from this failure.

B. This Contractor shall guarantee that all elements of the Systems are of sufficient capacity to meet the specified performance Requirements as set forth herein or as indicated.

C. Upon receipt of notice from the Owner of failure of any part of the Systems during the guarantee period, the affected part or parts shall be promptly replaced by this Contractor, at no charge to the Owner.

D. Before the final payment is made, this Contractor shall furnish a written guarantee covering the above Requirements.

1.14 MATERIALS

A. Materials shall be the best of their respective kinds and in full accord with the most modern mechanical construction. All materials shall be new and approved for use in Massachusetts.

B. All materials necessary to make the installation complete in every detail shall be furnished and installed under this Contract, whether or not specifically shown on the Drawings or specified herein.
C. It is the intent of the Specifications that one manufacturer be selected, not a combination, for any particular classification of materials.

D. Where materials, equipment apparatus, or other products are specified by manufacturer, brand name, type or catalog number, such designation is to establish the standard of desired quality and style and shall be the basis of the Bid.

1.15 MATERIALS AND EQUIPMENT HANDLING

A. This Contractor shall do all handling of his materials and equipment and the resulting cleanup, at his expense, in a safe and a satisfactory manner. Special attention shall be paid to the protection of life and property and the equipment of apparatus handled, and any corresponding damages shall be replaced, repaired, or paid for by this Contractor, as approved by the Architect. This Contractor shall provide all rigging, hoisting, and staging required to complete the Work of this Section, unless specifically noted otherwise.

1.16 MAINTENANCE AND PROTECTION OF MATERIALS

A. This Contractor shall be responsible for the maintenance and protection, from loss or damage of all causes, of all equipment, materials, and tools supplied by him and stored or installed on the job site, until final acceptance of the Project by the Owner.

B. This Contractor shall store his materials and equipment in the location designated by the Owner or Architect and maintain the storage area in a clean and safe condition.

C. This Contractor, at his own expense, shall clean, patch and repair any material and finishes of the building or its contents damaged during the execution of this Contract. Patches and repairs shall be performed by Trades specializing in the specific surfaces affected.

1.17 SUBMITTALS

A. Submit complete Shop Drawings on all materials and equipment intended to be used in the construction of the Systems in accordance with provisions of Section 01 33 00, Submittals.

B. The approval of equipment and materials does not relieve this Contractor from the responsibility of Shop Drawing errors in details, sizes, quantities, and dimensions which deviate from the Specifications, Contract Drawings, and/or job conditions, as they exist.

C. If apparatus or materials are submitted by this Contractor for those specified and such substitution necessitates changes in any mechanical or electrical equipment, or alteration to connections, piping supports, or construction, same shall be provided by this Contractor at no additional cost to the Owner.

D. The Architect's permission to make substitutions shall not relieve this Contractor from full responsibility for the Work.

E. Changes to Work already performed, made necessary by delays in Shop Drawing approval, are the responsibility of this Contractor.

F. Availability of Record Drawings shall be a prerequisite to scheduling a final inspection of this Work and said Drawings and Original Contract Documents will be used in checking completion of the Work.

G. Non-availability of Record Drawings or inaccuracies therein may be ground for cancellation and postponement of any scheduled final inspection of the Work until such time as the discrepancy has been corrected.

1.18 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS
A. Provide operating instructions to the Owner’s designated representative, with respect to operating and maintenance procedures, for all equipment and Systems installed under this Section. Operating instructions shall be given by the manufacturers’ representatives. The cost of such instruction, up to a full four (4) hours, shall be included in the Contract price.

B. At the completion of the Project, turn over to the Architect two (2) complete Maintenance Manuals containing the following:

2. Copy of fully executed permit(s).
3. Hard copy of approved As-Built Drawings.
4. DVD of approved As-Built Drawings in PDF and AutoCad format.
5. Complete approved submittals of all materials and equipment installed.
6. Names, addresses and telephone numbers of all suppliers of the materials and equipment.
7. Warrantees on all equipment.
9. Spare parts list of all equipment and System components.
10. Spare parts kits as may be required by governing Codes, Regulations, and Ordinances. (i.e backflow preventer per 310CMR Section 22.22(4)(c)).
11. Disinfection and backflow preventer test results.
12. Other documentation of permits, inspections, tests, etc. as applicable.

C. Each manual shall be typewritten and bound under a separate hardcover 3-ring binder and will be reviewed by the Architect. The manuals shall be clearly and permanently identified on the cover and binding with the name of the Project.

D. Refer to Section 01 77 00, Project Closeout, for general provisions covering Project closeout procedures.

1.19 CLEANING SYSTEMS

A. Before the Systems are accepted, all equipment shall be thoroughly cleaned to remove all dust, dirt and/or other foreign matter.

B. After the installation is complete, equipment with factory-finished surfaces shall be cleaned and damaged or scratched spots shall be touched up with the same type and color paint applied at the factory.

C. All equipment that is to receive finish paint by the Painting Contractor shall be cleaned by this Contractor and left ready to have surfaces prepared to receive paint.

1.20 RUBBISH REMOVAL
A. At the completion of the Work, or when ordered by the General Contractor or the Architect, this Contractor shall remove from the property, all the rubbish and waste materials belonging to him. Keep the job site free from the accumulation of waste materials and rubbish; premises must be maintained in a clean condition.

1.21 TEMPORARY STRUCTURES

A. This Contractor shall provide, on the premises and where directed by the Architect, shall maintain in good condition, and shall remove when directed, suitable and substantial watertight sheds in which he shall store all his materials and equipment.

1.22 TEMPORARY SERVICES

A. All water, electricity, fire protection and sanitary facilities required for safe and efficient construction during normal working hours shall be furnished in accordance with the General Requirements and Supplementary General Requirements.

1.23 TESTS

A. Furnish all labor, materials, instruments, supplies, and services and bear all cost for the accomplishment of the tests herein specified or required by governing Authorities. Correct all defects appearing under test, repeat the tests until no defects are disclosed, and leave the equipment clean and ready for use.

B. Perform any tests, other than herein specified, which may be specified by legal authorities or by agencies to whose Requirements this Work is to conform.

C. Dispose of test water and wastes after tests are complete, in a manner satisfactory to the Architect and in accordance with governing Regulations.

D. This Contractor shall coordinate and facilitate all inspections and tests required by Codes or the Authorities Having Jurisdiction.

1.24 EQUIPMENT ACCESS REQUIREMENTS

A. All Work shall be installed so that all parts requiring inspection, operation, maintenance and repair are readily accessible. Minor deviations from the Drawings may be made to accomplish this, but changes of magnitude shall not be made prior to written approval from the Architect.

B. Furnish access panels as required to permit access for adjustment, removal and the replacement and servicing of all equipment, and all other items requiring maintenance and/or adjustment.

C. Access panels shall be installed by the General Contractor.

D. Coordinate the exact location of access panels in all finished spaces with the Architect.

1.25 INSTALLATION REQUIREMENTS

A. This Contractor shall comply with all the governing Codes, Regulations, and Ordinances of all legally constituted Authorities having jurisdiction over the whole or any part of the Work herein specified. Governing Codes and Regulations supplement this Specification and shall take precedence in any case of conflict.

B. All equipment and materials furnished in connection with the installation shall be new and shall be furnished and installed in accordance with these Specifications and the Manufacturer's requirements.
C. All piping that is to receive paint shall not have any identifying labels, tags, markings, etc. (except for UL, FM, and code required nameplates) which would interfere with the preparation and painting of the surfaces.

D. All piping shall be installed concentrically within any floor, ceiling or wall penetration so as to allow for proper sealing of the penetration while maintaining the sealant flush with the adjoining surfaces.

1.26 WIRING DIAGRAMS

A. This Contractor shall provide to the General Contractor wiring diagrams for all equipment furnished under this Section for which wiring is to be installed by the Electrical Contractor.

PART 2 - PRODUCTS

2.00 PRODUCT APPROVAL

A. All piping, fittings, materials, equipment and appurtenances to be installed under this Section of the Work shall be approved for use in Massachusetts in accordance with 248CMR.

B. Where materials, equipment, apparatus, or other products are specified by manufacturer, brand name, type or catalog number, such designation is to establish the standard of desired quality and style and shall not be construed as fulfilling the requirements of 248CMR.

C. It shall be the responsibility of this Contractor to ensure that all items submitted to the Engineer to be installed in association with this Work comply with all requirements of 248CMR.

D. Approval by the Engineer of items submitted does not relieve this Contractor from the responsibility of complying with the requirements of 248CMR.

E. Installed items which do not meet the requirements of 248CMR shall be removed and replaced with approved products by this Contractor at no additional cost.

2.01 PIPE AND FITTINGS

A. Storm, Soil, Waste, and Vent Piping

1. Piping materials for storm and/or sanitary piping systems inside the building above the floor slab including soil, waste, and vent piping, unless otherwise noted, shall be standard weight, coated, hubless cast iron pipe and fittings manufactured in accordance with ASTM A-888 and the Cast Iron Soil Pipe Institute's Standard No. 301. The pipe shall be cast in one piece and shall be legibly marked on the barrel with the manufacturer's name and/or trademark. Couplings shall be heavy duty neoprene gasket with stainless steel clamp, screw and shield, manufactured in accordance with ASTM C-1540.

2. Piping materials for storm and/or sanitary piping systems below the floor slab and/or outside the building including soil, waste and vent piping, unless otherwise noted, shall be service weight cast iron pipe and fittings with hub and spigot joints, coated with tar or asphaltum, manufactured in accordance with ASTM A-74. The pipe shall be cast in one piece and shall be legibly marked on the barrel with the manufacturer's name and/or trademark. Gaskets shall be one-piece compression gasket made of neoprene in accordance with ASTM C-564.

3. Waste and vent pipe above ground, except for urinals, two inches (2") and smaller, may be Type “DWV” copper tubing with solder joint sweat drainage fittings, Schedule 40 galvanized steel or wrought iron pipe.

B. Domestic Water Piping
1. All domestic water piping inside the building, except as hereinafter specified, shall be Type "L" hard-drawn copper tubing, with soldered joint cast brass or wrought copper fittings. Pipe, fittings and solder shall be “lead free”.

2. Joining of copper tubing to dissimilar metals shall be accomplished using dielectric, brass or stainless steel fittings. The use of a dielectric may require the installation of a bonding jumper between the two metallic pipes. The bonding jumper shall be sized and installed by a licensed electrician.

3. All domestic water piping located below the floor slab and/or underground outside the building shall be type “K” seamless copper with brazed cast brass fittings. Pipe, fittings and brazing materials shall be “lead free”.

C. Gas Piping

1. Gas and gas train vent piping shall be Schedule 40 steel or wrought iron, complying with ANSI Standard B36.10, ASTM A53 or ASTM A106. Fittings shall be threaded malleable iron complying with ASME B16.3. All gas pipe 3” and larger shall be welded. Welding outlet fittings shall conform to ASTM A53. Condensate/sediment traps shall be installed at all points in accordance with the requirements of all applicable Codes, and at the gas inlet of each piece of gas-fired equipment.

2. Joining of steel or wrought iron pipe to dissimilar metals shall be accomplished using dielectric, brass or stainless steel fittings. The use of a dielectric may require the installation of a bonding jumper between the two metallic pipes. The bonding jumper shall be sized and installed by a licensed electrician.

D. Gas Vent Piping

1. Gas vent (exhaust) piping shall be equal to model PS pressure rated double wall galvanized steel vent as manufactured by Selkirk or approved equal. All vent piping shall be installed in strict accordance with the manufacturer's guidelines regarding sealing, clearance of the vent from combustibles, and of vent terminations from windows, doors, etc.

2.02 VALVES

A. General

1. Furnish and install valves, where indicated on Drawings or specified, so located that they may be operated, repaired or replaced with a minimum effort and repacked under pressure.

2. The basic system of valves (i.e., gate, ball, check for water service) shall be of one manufacturer.

3. Access panels shall be furnished by this Contractor for all valves concealed within non-removable ceilings or walls. Coordinate access panel type and location with Architect. Access panels shall be installed by the General Contractor.

B. Domestic Water System Valves

1. All valves shall be “lead free”.

2. Shut-off valves (gate) shall be furnished and installed on connections to each group of fixtures, fixtures fed separately from mains and where shown on the Drawings. All valves shall be brass and of 300 C.W.P. design.

C. Gas System Valves
1. Gas cocks shall be furnished and installed at connection to each piece of equipment, at each riser and where shown on the Drawings.

2. Gas cocks shall be brass body tee handle types with threaded ends manufactured in accordance with AGA Requirements.

2.03 PIPE HANGERS, SUPPORTS, AND CHANNELS

A. All piping shall be rigidly supported from the building structure by means of approved hangers and supports. Pipes shall be supported so as to maintain the required grading and pitching of lines, to prevent vibration and to secure piping in place; they shall be arranged so as to provide for proper expansion and contraction of pipe.

B. Where required, all piping and their attachments shall be designed for seismic forces as per the Requirements of the Massachusetts Building Code. It shall be the responsibility of this Contractor to provide all necessary calculations as required by the Building Code. One copy shall be submitted to the Engineer for his review, and one copy shall be submitted to the Structural Engineer for approval of attachments to the building structure.

C. Maximum spacing of hangers on horizontal runs of pipe shall be in accordance with the following:

1. Cast Iron:  
   - < 10'-0" length: 5'-0" o.c.
   - ≥ 10'-0" lengths: 10'-0" o.c.

2. Copper:  
   - 1¼" and smaller: 6'-0" o.c.
   - 1½" and larger: 10'-0" o.c.

3. Steel:  
   - ¾" or 1": 8'-0" o.c.
   - 1¼" and larger: 10'-0" o.c.

D. If Codes having jurisdiction require closer spacing, the hanger spacing shall be as required by Code in lieu of the foregoing. Provide hangers at all changes in direction and on both sides of concentrated loads (pumps, valves, strainers, regulators, etc.).

E. All horizontal piping 2" and smaller shall be supported with adjustable band hangers. All piping 2½" and larger shall be supported by adjustable clevis hangers. Vertical piping shall be supported by extension type split ring hangers along the wall, and riser clamps where passing through floors. Hangers and clamps for uncovered (un-insulated) copper and brass piping shall be factory applied plastic coated steel or copper hangers. Hanger rods shall have machine threads.

F. All hangers on insulated lines shall be sized to fit the outside diameter of the pipe insulation. Provide pipe covering protection saddles at all hangers on insulated lines of sheet metal 18 gauge and twelve inches (12"), minimum length, and shall cover 180 degrees of arc (lower quadrants) on the covering at all hangers on insulated piping systems.

G. Unless noted otherwise, all hangers, rods, supports, channels, and accessories shall be galvanized.

H. All piping installed under this Section of the Specifications shall be independently supported from the building structure and not from the ceiling, walls, piping, ductwork, or conduit of other Trades. All supplementary steel, including factory-fabricated channels required to meet the Requirements specified herein, shall be furnished and installed by this Contractor.

I. All Work of this Section shall be installed in accordance with the seismic Requirements of 780 CMR. It shall be the responsibility of this Contractor to coordinate the installation of his Work with said Requirements.
J. All piping to be installed on the roof shall be supported by rubber blocks with unistrut channel inserts equal to Cooper B-Line model DB. Furnish and install supports of appropriate height, width and capacity as required for the installation. Furnish and install accessories as required.

2.04 VENTS THROUGH THE ROOF

A. All pipes extending through the roof for the sanitary system shall be the same material as the piping system. Vents shall be of size indicated on the Drawings and extend at least 18 inches (18") above the roof, ending in the top of pipe, which will be flashed by the Roofing Contractor.

B. Do not locate vent terminals closer than 10 feet from fresh air intakes. Vents closer than 25 feet from fresh air intakes shall terminate at a minimum of 2 feet above the highest elevation of the fresh air inlet. This Contractor shall relocate and resize vent terminals from where shown on the Drawings and/or extend the vent terminal to the height as required by Code, if required after Coordination with all other Trades.

C. Offset all vents so as not to be visible from the front of the facility, whether or not indicated as such on the Drawings.

2.05 ACCESS PANELS

A. Furnish access panels, for installation by the General Contractor, in walls and ceilings at locations indicated on Drawings or as required to permit access for adjustment, removal, and replacement of all equipment, such as valves, traps, vacuum breakers, and all other items requiring maintenance or adjustment.

B. Where possible, all access panels shall be located in closets, storage rooms and/or other non-public areas, in a skillful and competent manner, positioned so that the junction can be easily reached. The size shall be sufficient for its intended purpose (minimum 16" x 16"). When access panels are required in corridors, lobbies, or other habitable areas, they shall be located as directed by the Architect.

C. Access panels shall be of steel, prime painted, and furnished with one-piece flange, piano hinge, and cylindrical lock, equal to Karp model DSC-214M, Milcor model M, Elmdor DW Series. Furnish with anchor straps when installing in masonry openings.

D. Access panels located in Fire Rated walls and ceilings shall bear the U.L. Label ensuring fire-rated construction as applicable to the fire rating of the assembly.

2.06 PIPE SLEEVE

A. All pipe sleeves shall be furnished and set by this Contractor. Their location and setting shall be carefully coordinated with the Requirements or limitations of the structural member they are passing through. Any conflict arising shall be solved by utilizing the best Trade practices.

B. Sleeves and plates shall be black steel, Schedule 40, in accordance with A.S.T.M. Specifications A-120.

C. Sleeves shall be provided at all locations where pipes pass through concrete or masonry, and shall be sized so as to provide for piping covering and for lateral expansion.

D. The ends shall be flush with the surfaces, except in floors, where it is possible for water to accumulate, such as toilets, janitor's closets, etc., in which case they shall terminate one inch (1") above the finished floor.

E. Where pipes pass through partitions, ceilings and furring (plaster and glazed tile), furnish and install No. 24 gauge galvanized iron sleeves, over which furnish and install cast metal floor plates of the escutcheon type, designed to cover the sleeves and to remain in permanent position.
F. Space between all pipes and sleeves shall be packed with graphite packing and Fire-Rated sealant.

G. Furnish labor to set and fasten all sleeves before the floors and walls are finally constructed.

H. Provide chromium-plated escutcheon plates at all exposed locations in finished rooms where pipes pass through walls, floors, and ceilings.

2.07 INSULATION

A. All hot water piping shall be insulated with one-inch (1”) thick fiberglass insulation with factory applied, all-purpose, vinyl-coated and embossed vapor barrier laminate with pressure sealing lap adhesive seam.

B. All cold-water piping shall be insulated with half-inch (½”) thick fiberglass insulation with factory-applied, all purpose, vinyl-coated and embossed vapor barrier laminate with pressure sealing lap adhesive seam.

C. Insulate all fittings, flanges, valves, etc., for the services requiring insulation, same as specified for their respective piping, with white PVC fitting covers as manufactured by Zeston or approved equal, installed in accordance with the manufacturer’s instructions.

D. All joints between adjacent sections of insulation shall be butt tightly together, lapping joints with vapor barrier cement and butt strip seals.

E. Plain ends shall be sealed with vapor barrier cement.

F. All insulated piping which is exposed within finished spaces shall be covered with high impact, 30 mil, UV resistant PVC jacketing, factory cut and curled to fit snugly around pipe insulation. All seams shall be overlapped and sealed with solvent weld adhesive.

2.08 CLEANOUTS

A. Clean-outs shall be installed where indicated on the Drawings and/or where required in storm, soil, and waste pipes. Clean-outs shall be installed at the base of all risers and at each change of direction.

B. Clean-out plugs shall be heavy cast brass of the screwed type, full size up to and including four inches (4”).

C. Clean-outs shall be same size as pipe for piping up to four inches (4”) in size and not less than four inches (4”) for piping larger than four inches (4”).

D. Clean-outs shall be brought up flush with the finished floor level.

E. Access cover type shall be equal to J.R. Smith 4023 round bronze top for concrete and carpeted floors, or J.R. Smith 4163 square bronze top for tiled floors. Furnish with carpet clamping flange, tile recess or terrazzo recess as applicable. Coordinate with architectural finishes.

F. All floor clean-out access covers shall be manufactured by J.R. Smith, Zurn, or Josam.

G. Access to clean-outs in walls and/or ceilings shall be provided by an access panel.

2.09 DRAINS

A. Floor drains shall be installed where shown on the Drawings and where required by Code.
B. Floor drains in waterproofed floors and areas shall have galvanized iron clamping rings with six (6lb) pound lead flashing to bond nine inches (9”) in all directions. Drains shall be checked with Architect's Drawings to determine depth of the flashing collar. Brass extension pieces shall be provided if necessary.

C. Floor drain “FD” shall be equal to Watts Drainage Products model FD-200-B on-grade heavy duty epoxy coated cast iron floor drain with anchor flange, weep holes, adjustable 6”, heavy duty nickel-bronze strainer, and no-hub outlet with trap primer tapping. Outlet size shall be as shown on the Drawings

2.10 TRAP PRIMERS

A. Furnish and install a trap primer to each floor drain or trap on the sanitary piping system which requires the liquid trap seal to be maintained. Trap primers shall be equal to Prime Perfect 695 Series as manufactured by Sioux Chief.

B. All trap primers shall be located behind access panels or in readily accessible areas.

C. The installation of trap primers shall conform to manufacturer's recommendations.

D. Furnish and install with an isolation valve, accessories and supply tubes as required.

2.11 HOSE BIBBS

A. Hose bibbs shall be installed where shown on the Drawings and where required by Code.

B. Hose bibbs shall be equal to Mifab model MHY-90 exposed, brass body with cast iron wheel handle, and anti-syphon vacuum breaker with ¾” hose connection.

2.12 PIPING SYSTEMS IDENTIFICATION

A. All new piping and existing piping located in the Work area shall be identified as to contents and direction of flow in intervals not exceeding ten (10) feet, at each change in direction, and on both sides of penetrations through walls, floors, and/or ceilings.

B. All systems identification materials shall meet ANSI standard A13.1-1996 and be as manufactured by Seton Name Plate Corporation or approved equal.

C. Valve tags shall be circular 19 gauge brass, 1½” in diameter, with black filled text Seton No. M4506 with No. 16197 brass hooks, No. 16182 bass jack chain, or No. 6 nickel-plated bead chain. Letter abbreviations shall be 1¼” high above ½” high numbers. Provide three (3) laminated valve tag charts indicating valve number, valve location, pipe contents, and equipment or area served.

D. Pipe markers shall be “Setmark” type pre-molded acrylic plastic, snap on markers either 8” or 12” long with overlap, as manufactured by Seton or approved equal. The background, field and legend colors and letter sizes shall be per ANSI A13.1 – 1996 standards.

2.13 ESCUTCHEONS

A. Install escutcheons around exposed pipe passing through finished floors, walls or ceilings. Escutcheons shall be on piece heavy cast brass, chromium plated, with adjustable set screw and shall be of sufficient outside diameter to cover sleeve opening and shall fit snugly around pipe.

PART 3 - EXECUTION
3.01  OPERATION AND START-UP

A. Furnish all labor, equipment, materials, and test necessary to place all equipment and Systems into operation, and obtain approval of the entire Plumbing System from the local building department.

B. Materials, fixtures and fittings shall be properly protected and all pipe openings shall be temporarily closed so as to prevent obstructions and damage.

C. Prior to final inspection, clean all fixtures and flush all piping and equipment and then place all equipment and fixtures into working order to demonstrate the fitness of the installation.

3.02  CLEANING AND FLUSHING

A. The potable water system shall be flushed and disinfected as per 248 CMR, 10.14 (13).

B. This contractor shall obtain the services of an independent testing agency to test the potable water system after disinfection in accordance with the EPA's (Environmental Protection Agency) Primary Drinking Water Standards for Human Consumption. Test results shall be submitted prior to his request for a final inspection.

C. The disinfection and testing shall be repeated, at no cost to the Owner, until no defects are discovered.

3.03  COORDINATION

A. The structure and its appurtenances, clearances and the related services, such as plumbing, heating, ventilation, and electric service, have been planned to be adequate and suitable for the installation of equipment specified under this Section. The Owner will not assume any increase in cost caused by differing Requirements peculiar to a particular make or type of equipment, and any such incidental cost shall be borne by this Contractor.

B. This Contractor shall be responsible for Work and equipment furnished and installed by him or his Subcontractor(s) until the completion and final acceptance of this Contract, and he shall replace any Work that may be damaged, lost, or stolen, without additional cost to the Owner.

C. Cutting and Patching - It shall be the duty of this Contractor to consult with and give to the General Contractor, the exact location and size of all openings and full information as to cutting and patching necessary for the same.

D. In the event this Contractor fails to provide sleeves, inserts, and templates or fails to notify other Contractors well in advance of his Requirement, he shall be responsible for paying for all cutting and patching made necessary by his failure to do so.

E. The location and method of attaching supports for plumbing equipment to the building structure shall be coordinated with the Architect and General Contractor prior to the installation of any equipment. This Contractor shall take necessary precautions to insure the building structure and components are not overstressed by the support of plumbing equipment.

F. In the event there is a conflict or inadequate space for the proper installation of plumbing Systems, this Contractor shall prepare a scaled (\(\frac{1}{4}'' = 1'-0''\) min.) composite sketch, showing the building structure and all equipment and items affecting the installation, to clearly identify the areas of conflict. This Contractor shall submit four (4) copies of the sketch, along with a written explanation of the problem and his proposed solution, to the Engineer for his review and determination on what action to take to resolve the conflict.

G. It shall be the duty of this Contractor to furnish full information to all Trades relative to the Work they are to do in connection with Work under this Section. This includes data for wiring, including wiring diagrams, equipment foundations, pipe connections, etc., furnished under other Sections.
304 PAINTING

A. This Contractor shall apply one coat of anti-rust primer and two coats of anti-rust flat black enamel to all steel support hangers and other steel or iron elements of the Plumbing System, furnished and installed by him. Paint shall be omitted from all items with a galvanized finish.

B. Paint all gas piping with one coat of anti-rust primer and two coats of anti-rust yellow enamel.

C. All surfaces to be painted shall be free of dirt, scale, rust, grease, and oil. Paint shall be applied in accordance with the Manufacturer's Requirements.

D. This Contractor shall touch up, with spray paint, all scratched or damaged surfaces of equipment with factory finish. Spray paint shall be the same color and type as factory finish.

END OF SECTION
NB POLICE STATION HEADQUARTERS – SALLY PORT ADDITION
NEW BEDFORD, MASSACHUSETTS
Mount Vernon Group Architects, Inc., Project No. 02014.43

December 5, 2018

THIS PAGE LEFT INTENTIONALLY BLANK
1.01 FILED SUB-BIDS - TIME, MANNER AND REQUIREMENTS FOR SUBMITTING SUB-BIDS

A. HVAC is stipulated as a Filed Sub-Bid under Part D, Item 2 of the Form for General Bid.

B. All sub-bids shall be submitted on the Form for Sub-Bid furnished by the Awarding Authority, as required by section 44F of Chapter 149 of the Massachusetts General Laws, as amended.

C. Sub-bidders must be DCAM Certified in the listed trade and shall include a current DCAM Sub-bidder Certificate of Eligibility and a signed DCAM Sub-bidder's Update Statement with the bid.

D. Sub-Bids must be filed with the Awarding Authority in a sealed envelope, before time, on the date stipulated in the Advertisement part of the front-end specifications.

E. Specific information relating to the sub-bidders is set forth in the Contract Documents, under the heading “Notice to All Bidders, Including Sub-Bidders” and the attention of sub-bidders is directed thereto.

F. Work to be done under this SECTION is shown on Contract Drawing numbered M01.01. The remaining Contract Documents are included for relevance.

G. Sub-Sub-Bid Requirements:

1. Sub bidder's attention is directed to Massachusetts G.L. Chapter 149 Section 44F, as amended, which provides in part as follows:

   a. Each sub bidder shall list in Paragraph E of the “Form of Sub bid” the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the Section of the Specifications for that sub trade requires such listing, provided that, in the absence of a contrary provision in the Specifications, any sub bidder may, without listing any bid price, list his own name or part thereof and perform that work with persons on his own payroll, if such sub bidders, after sub bid openings, shows to the satisfaction of the Awarding Authority that he does customarily perform such class of work with persons on his own payroll and is qualified to do so. This Section of the Specifications requires that the following classes of work shall be listed in Paragraph E under the conditions indicated herein.

      Ductwork – 23 00 00
      Insulation – 23 00 00
      Automatic Temperature Controls – 23 00 00
      Testing and Balancing – 23 00 00

1.02 PROVISIONS INCLUDED

A. The Conditions of the Contract and Division 01 - General Requirements, apply to the Work under this Section.

1.03 SCOPE OF WORK

A. The work described herein shall be interpreted as work to be done by the HVAC Contractor.
B. The work covered by this Section of the Specifications includes the furnishing of all labor and materials and in performing all operations in connection with the installation of the HVAC work.

C. The work includes, but is not limited to, the following,

1. Exhaust Fans.
2. Gas-fired Unit Heaters.
3. Sheet Metal Ductwork.
4. Duct Insulation.
5. Grilles, Registers and Diffusers.
6. Automatic Temperature Controls.
7. Testing, Adjusting and Balancing.
8. O&M Manuals.
10. Record Drawings.
11. Electrical Work. (Refer to Electrical Drawings and Specifications)
12. Plumbing Work. (Refer to Plumbing Drawings and Specifications)
13. Cutting and Patching.

1.04 RELATED WORK UNDER OTHER SECTIONS

A. The following work is not included under this Section and will be performed under the Sections indicated:

1. By the General Contractor:
   a. Masonry and concrete work.
   b. Finish painting, including painting of supporting steel for mechanical equipment.
   c. Flashing and waterproofing of all new duct, pipe, louver penetrations through the wall.
   d. Roof curb installation and flashing.
   e. Coring.
   f. Louvers furnished under this section.

2. By the Electrical Contractor (Refer to the Electrical Drawings and Specifications for more Information):
   a. All wiring required for the automatic temperature control system shall be provided by the Control Contractor under this Section.
   b. Automatic temperature control wiring shall be provided under this Section.
   c. All electrical power wiring and connections and all disconnect switches not provided with or as integral part of the HVAC equipment shall be provided by the Electrical Contractor.
   d. Motor starters shall be furnished and installed by the HVAC Contractor and wired by the Electrical Contractor.

3. By the Fire Protection Contractor (Refer to the Fire Protection Drawings and Specifications for more Information).
   a. Sprinkler piping, heads, devices, and equipment as shown on the Fire Protection drawings.

4. By the Plumbing Contractor (Refer to the Plumbing Drawings and Specifications for more Information).

1.05 CODES, ORDINANCES AND PERMITS

A. All material and work provided shall be in accordance with the following codes and standards:

2. State Department of Public Safety.
3. Local codes.
4. Standards of the Underwriters Laboratories (UL).
5. Occupational Safety and Health Act (OSHA).
7. Massachusetts and National Electrical Codes.

B. Where the contract documents indicate more stringent requirements than the above codes and ordinances, the Contract Documents shall take precedence.

C. All necessary permits, inspections, approvals, etc. are to be obtained and paid for by the contractor.

1.06 CONTRACT DRAWINGS AND SPECIFICATIONS

A. The drawings showing layout of the HVAC systems indicate the approximate location of piping, ductwork, equipment and location of services. They are schematic and are not intended to show the exact routing or all fittings required. The final determination as to the routing shall be governed by structural conditions and other obstructions. No cutting or removal of any wood or concrete members will be allowed, unless approved in writing by the Architect.

B. The right to make any reasonable change in the location of ducts, piping, apparatus and equipment up to the time of roughing-in is reserved by the Architect without involving any additional expense to the Owner.

C. The specifications supplement the drawings and provide specifics pertaining to the methods and material to be used in the execution of the work.

D. Any discrepancies between the drawings and specifications or within the drawings/specifications shall be brought to the attention of the Architect/Engineer for clarifications.

E. Contractor shall read and understand the Contract Documents and submit the bid in accordance therewith. Contractor shall visit the site and get familiar with the local conditions under which the Work has to be performed. Failure to so examine the Contract Documents and site will not relieve the Contractor from any obligation under the bid as submitted.

1.07 SHOP DRAWING AND MATERIALS SCHEDULE

A. Within fifteen days after the date of notice to proceed and before purchasing any materials or equipment, submit for approval a complete list, in six copies, of all materials to be incorporated in the work. After the list has been processed, submit complete shop drawings of all equipment. These shop drawing submittals shall be submitted within fifteen days after the processing date of original submittal list.

B. The approval of equipment does not relieve the HVAC Contractor from the responsibility for shop drawing errors in details, sizes, quantities, wiring diagram arrangements and dimensions which deviate from the specification, contract drawings and/or job conditions as they exist.

C. Refer to General Requirements for substitution of equipment and submittal of shop drawings. If apparatus or materials are substituted for those specified and such substitution necessitates changes in or additional connections, supports or construction, same shall be provided. The HVAC Contractor shall assume cost and entire responsibility thereof.
D. Submit the name(s) and contact information for a minimum of two qualified vendors that are eligible to provide operations and maintenance on the installed HVAC system.

1.08 COOPERATION AND COORDINATION WITH OTHER TRADES

A. The work shall be so performed that the progress of the entire building construction including all other trades, shall not be delayed nor interfered with. Materials and apparatus shall be installed as fast as conditions of the building will permit and must be installed promptly when and as desired.

B. Confer with all other trades relative to location of all apparatus and equipment to be installed and select locations so as not to conflict with work of other Sections. Any conflicts shall be referred immediately to the Architect/Engineer for decision to prevent delay in installation of work. All work and materials placed in violation of this clause shall be readjusted to the Architect's/Engineer's satisfaction, at no expense to the Owner.

C. Where work of this section will be installed in close proximity to work of other sections or where there is evidence that the work of this section will interfere with work of other sections, assist in working out space conditions to make satisfactory adjustment. Prepare and submit for approval 3/8-inch scale or larger working drawings and sections, clearly showing how this work is to be installed in relation to the work of other sections. If the work of this section is installed before coordinating with other trades or so as to cause interference with work of other trades, make changes necessary to protect conditions without extra charge.

D. Keep fully informed as to the shape, size and position of all openings required for all apparatus and give information in advance to build openings into the work. Furnish and set in place all sleeves, pockets, supports and incidentals.

1. There are numerous existing openings and penetrations in masonry construction currently utilized by existing equipment. Following the demolition of existing systems, existing openings are to be utilized for the installation of the work of this Contract.

E. All distribution systems which require pitch or slope such as sanitary drains and water piping shall have the right of way over those which do not. Confer with other trades as to the location of pipes, ducts, lights and apparatus and install work to avoid interferences.

F. Where there is evidence that work of this Subcontractor will interfere with the work of other trades, this Subcontractor shall assist in working out space conditions to make satisfactory adjustments.

G. This Subcontractor shall, with the approval of the Engineer and without extra charge, make reasonable modifications in his work as required by structural interference’s, or by interference with work of other trades, or for proper execution of the work.

H. If this Subcontractor installs his work before coordinating with other trades and his work causes interference with the work of such other trades, he shall make all necessary changes in his work to correct the condition without extra charge and as directed by the Engineer.

I. This Subcontractor shall protect all materials and work of other trades from damage that may be caused by his work and shall make good any damages so caused.

1.09 RECORD DRAWINGS

A. Provide two sets of black line prints to be used as working record drawings during construction. One set of prints shall be maintained at the job site and shall, at all times, be accurate, clear and complete, showing the actual location of all equipment ducts and piping. The working record drawings shall be available for review at the job site by the Architect's/Engineer's field representative. The marked up As Built Drawings required to be maintained under this section are Drawing M01.01.
B. Any addenda sketches, supplementary drawings and change orders issued during the course of construction shall be transferred to the working record drawings.

C. At the completion of all work submit an accurate, checked set of working record drawings. Non-availability of these drawings will postpone the final inspection until the record drawings are available.

D. The Contractor shall incorporate all changes on the original drawings. The contractor shall submit to the designer, disks of drawings on Auto CAD Version 2008 format with two sets of prints and reproducible drawings on mylar. Inaccuracies in Record Drawings, as determined by the designer, shall be corrected.

E. All costs related to these requirements shall be paid for by the HVAC Contractor.

1.10 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS

A. Provide operating instructions to the Owner's designated representatives with respect to operating functions and maintenance procedures for all equipment and systems installed. The cost of providing a manufacturer's representative at the site for instructional purposes shall be included in the contract price. The operating instructions shall be presented in scheduled, pre-arranged formal periods. The HVAC Contractor shall include in his contract price, the cost for instructions, up to eight (8) hours, which will not necessarily be consecutive.

B. At the completion of the project, turn over to the Architect/Engineer, two complete manuals containing the following:
   1. Complete shop drawings of all equipment.
   2. Operation description of all systems.
   3. Names, addresses and telephone numbers of all major suppliers of equipment on a separate indexing sheet.
   4. Preventive maintenance instructions for all equipment.
   5. Spare parts list of all system components.

C. The Contractor shall collect the operating instructions, bind them into two complete sets and deliver them to the Architect/Engineer who will check for completeness and deliver them to the Owner. All information shall be in three-ring, loose-leaf binders.

D. Delivery of the operating and maintenance manuals shall be a condition precedent to final payment.

1.11 GUARANTEE

A. This Contractor shall obtain, in the Owner's name, the standard written manufacturer's guarantee for one year or greater of all materials furnished under this section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities which this Contractor may have by law or other provisions of the contract documents.

B. This Contractor shall warranty workmanship and materials for a period of not less than one year from the date of substantial completion. Should any defects in materials or workmanship appear during this period, they shall be corrected or replaced by the Contractor to the satisfaction of the Architect, and at no expense to the Owner.

1.12 PERMITS

A. This Contractor shall be responsible for obtaining and paying for all permits and inspections required to complete all work described in this section.
1.13 STORAGE OF MATERIALS

A. Store materials prior to their installation where designated by the General Contractor. Be responsible for all stored equipment and materials and protect all installed equipment and materials from damage.

1.14 INSPECTION AND TESTS

A. If inspection of materials installed shows defects, such defective work, materials and/or equipment shall be replaced at no cost to the Owner and the inspection and tests repeated.

B. Make all reasonable tests as required and prove the integrity of all work and leave the entire HVAC installation in correct adjustment and ready to operate.

1.15 ELECTRICAL CHARACTERISTICS

A. In general, and unless specifically indicated otherwise in the specifications or noted on the drawings, all HVAC equipment shall be of the HP, voltage, and phase as indicated on the drawings.

B. Control wiring and conduit for the HVAC systems shall be furnished under this Section. Power wiring, including provisions for disconnect switches not otherwise furnished as an integral part of the mechanical equipment, is under the work of the Electrical Contractor.

C. Fractional horsepower motors wired for single phase operation shall have automatic reset overload protection built into the motor.

1.16 DEFINITION OF TERMS

A. “Furnish” or “Supply” means to purchase, procure, acquire and deliver.

B. “Install” means to rig, erect, mount and connect, unless specifically noted otherwise.

C. “Furnish and Install” means to supply, deliver, rig, erect, mount and connect in readiness for operation, unless specifically noted otherwise.

D. “Provide” is synonymous with “Furnish and Install”.

E. “Piping” means pipe, tubing, fittings, flanges, unions, valves, strainers, traps, hangers and other accessories related to such piping.

F. “Concealed” means hidden in chases, furred spaces and walls, above ceilings or enclosed in construction.

G. “Exposed” means visible or not installed “Concealed” as defined above.

H. “Approved Equal” or “or equal” means any equipment or material which is approved by the Engineer as equal in quality, durability, appearance, strength, design and performance to the equipment or material originally specified.

I. “Underground” means buried exterior to or within the building.

1.17 SCAFFOLDING AND STAGING

A. All staging, exterior and interior, required to be over eight feet in height, shall be furnished and erected by this Contractor and maintained in safe condition by him without charge to and for the use of all trades as needed by them.
for proper execution of their work, except where specified to the contrary in any filed sub-bid Section of the Specification.

1. Erection and dismantling of staging shall be performed only by trained, certified, and experienced staging personnel qualified to perform such work.

2. Copies of such certifications, clearly indicating qualifications, shall be provided to the Architect prior to commencement of such erecting and dismantling work.

B. Provide, maintain and remove safe and adequate interior and exterior staging, ladders, scaffolding, hoists, and all other related equipment for proper and complete execution of the work of this section in accordance with requirements of the Contract Documents. Staging, scaffolding, hoists and all other related equipment shall comply with all applicable federal, state and local regulations.

C. Staging, ladders, scaffolding, hoists and all other related equipment shall be provided, maintained and removed when no longer required.

1.18 WORK COORDINATION AND JOB OPERATIONS

A. HVAC equipment shall not be installed in congested and possible problem areas without first coordinating the installation of same with the other trades. Relocate HVAC equipment should it interfere with the proper installation of equipment to be installed by the other trades.

B. Particular attention is directed to the coordination of ductwork with the equipment of other trades being installed in and above the ceiling areas. Conflicts in mounting heights and clearances above hung ceilings shall be brought to the attention of the Architect for a decision before equipment is installed.

C. Furnish to the other trades, all information relative to the portion of the HVAC installation that will affect them, so that they may plan their work and installations accordingly.

1.19 REBATES

A. Contractor shall assist the Owner in obtaining all eligible utility rebates and transferring these rebates to the Owner.

PART 2 - PRODUCTS

2.01 PIPE AND FITTINGS

A. Condensate Drain Piping: Material shall be Schedule 40 PVC piping with drainage fittings. Piping shall be sized per manufacturer’s recommendations. Provide P-trap for each condensate drain line connection.

2.02 SHEET METAL WORK

A. Furnish and install, in an approved manner, all sheet metal work that is indicated on the drawings or that is specified or required for the various systems of heating, ventilation, air conditioning, return air and exhaust air.

B. All sheet metal work shall be manufactured and erected in a first class and workmanlike manner, in accordance with the Duct Manual of the Sheet Metal and Air Conditioning Contractors National Association, Inc. and shall be approved by the Architect. All ducts, unless otherwise approved, shall be true to the dimensions indicated on the plans and shall be straight and smooth on the inside with neatly finished joints. The ducts shall be securely anchored to the building construction in an approved manner and shall be so installed as to be completely free from vibration under all conditions of operation. All ducts shall be supported in accordance with requirements of Plate Numbers 18, 19 and 20 of the SMACNA Duct Manual.
C. All slip joints for low velocity rectangular ducts shall be made in direction of air flow and, unless otherwise indicated on the plans, all elbows shall have long turns with the inside radius no less than the plan dimension of the duct. Where short radius elbows or square corner elbows are used, they shall be fitted with turning vanes. All notches for connecting sections of duct and all governing seam notches shall not be cut any deeper than necessary to insure tight corners. Any notched corners not meeting with approval shall be removed and reinstalled or sealed with solder. All transverse and longitudinal joints shall be sealed airtight to the satisfaction of the Architect/Engineer with United McGill water based duct sealer or approved equal. Duct sealer shall be a vinyl copolymer mastic formulated to withstand temperature from -20°F to +150°F. Sealant shall have a temperature UL Classification with a flame spread of 5 or less and smoke developed of 0 when tested on both 18-gauge galvanized steel and inorganic reinforced cement board.

D. Exhaust and air intake plenums shall be soldered tight at all bottom seams and on all side seams.

E. Unless otherwise specified, all rectangular ducts shall be of the best bloom galvanized steel of the U.S. Standard gauges specified below and shall be stiffened by cross breaking and by use of galvanized rolled steel angles as specified below:

<table>
<thead>
<tr>
<th>Rectangular Sizes</th>
<th>Gauge No.</th>
<th>Galvanized Iron Angle Stiffeners</th>
<th>Center Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 14&quot;</td>
<td>26</td>
<td>Standing Seams</td>
<td></td>
</tr>
<tr>
<td>15&quot; to 30&quot;</td>
<td>24</td>
<td>Standing Seams</td>
<td>Not Greater Than 33&quot;</td>
</tr>
<tr>
<td>31&quot; to 60&quot;</td>
<td>22</td>
<td>1&quot; x 1&quot; x 3/16&quot;</td>
<td>Not Greater Than 33&quot;</td>
</tr>
<tr>
<td>61&quot; to 84&quot;</td>
<td>20</td>
<td>1-1/2&quot;x1-1/2&quot;x3/16&quot;</td>
<td>Not Greater Than 33&quot;</td>
</tr>
</tbody>
</table>

F. All rectangular sheet metal ductwork, unless otherwise specified, shall be constructed with longitudinal Pittsburgh Lock seams thoroughly flattened down to make a tight joint. Transverse joints shall be made up with slip joints and standing lock seams. Branches to and from the main trunk shall be made at an angle but shall, in no case, exceed 45º to the line of air flow.

G. Flexible Connections: The inlet and outlet of each of the exhaust fans and rooftop units shall be connected to the ductwork by an approved flexible connection made of Ventfab as manufactured by Iden Associates, tightly secured to the fan inlet and outlet with metal bands. A minimum 4" space shall be maintained between the duct and fan connection and the flexible connection shall not be stretched tight.

H. The exact locations of all ducts to be installed shall be agreed upon among the mechanical trades under the supervision of the General Contractor before work is fabricated or installed. In general, the plumbing piping shall be given the right of way owing to pitch requirements and the HVAC Subcontractor shall raise or lower his ducts to clear the plumbing piping.

I. All openings in building construction surrounding transversing ducts shall be sealed with mineral wool or other non-combustible material to prevent the passage of flame or smoke.

J. Fire Dampers: Furnish and install fire dampers, where indicated on the drawings, as required by the Massachusetts Building Code, NFPA, and as specified herein. Fire dampers shall be as manufactured by Greenheck, Prefco Products, Inc., Ruskin, or approved equal.

1. Unless otherwise indicated, fire dampers shall be the interlocking blade curtain type fire damper and shall be UL approved and labeled. Type B (damper curtain out of the air stream) shall be used. Fire dampers shall be gravity operated for vertical installation and shall be provided with closure springs and latches for horizontal installation. Dampers shall be dynamically rated to close under air flow.

2. All fire dampers shall be constructed and installed in accordance with the conditions of their approval, the manufacturer’s instructions, NFPA Bulletin #90A and the National Board of Fire Underwriters Pamphlet No. 90. Samples of fire damper shall be submitted to and approved by the local authorities having jurisdiction. Fire dampers shall have the UL time rating as required by the building element/assembly in which the fire damper is to be installed.
3. A full size and tight access door with catches shall be provided at all dampers, regardless of type. The doors shall be of metal clad construction with the same thickness of insulation as that specified for the ducts.

K. Access doors installed in ducts near fire dampers shall be made of same gauge galvanized steel as ducts in which they are installed, hinged to a galvanized mounting frame.

L. Volume Dampers: Furnish and install where shown on the drawings or where required, air splitter dampers and/or butterfly dampers with indicating and locking quadrants or push rods and pillow blocks. The dampers shall be two gauges heavier than the ducts in which they are installed. In each branch duct runout where indicated or required, place so as to be accessible, a friction type damper.

1. Damper blades shall be riveted to the supporting rod. Case or malleable brackets riveted to the sides of the ducts shall be used to support the damper rod. Splitter damper shall be sufficiently long to extend the full width of the branch duct to which attached. Where necessary, they shall be curved to scoop branch duct air out of the main duct stream.

M. Sound Insulation: Furnish and install in the first 10 feet of all supply and return air ductwork, from the rooftop units or where called out or shown on the drawings 1" thick Ultralite duct liner of 1-1/2 pound density with vinyl coating one side, or equal. Fasten to inside of ducts with Type A stic klips, Type S stic klip adhesive and speed clip washers. For medium pressure ductwork the acoustical lining shall be rated for medium pressure ducts.


O. Duct Sizes: All duct sizes indicated on the drawings are inside dimensions of either the bare metal or the sound insulation where specified. Where sound insulation is specified for installation, the sheet metal ducts shall be increased in size to provide the free area inside the sound insulation called for on the drawings.

2.03 EXHAUST FANS

A. Furnish and install exhaust fans where shown on the drawings. Exhaust fans shall be in accordance with the schedule on the drawings for type, size, capacity, motor sizes, model numbers and components. Fans shall conform to the design and fabrication requirements of the AMCA Standard Test Code for Air Moving Devices and shall be as manufactured by Greenheck, Penn, Loren Cook or approved equal.

B. Roof exhaust fans shall be centrifugal belt driven type. The fan wheel shall be centrifugal backward inclined constructed of aluminum and shall include a wheel cone carefully matched to the inlet cone for precise running tolerances. Wheels shall be statically and dynamically balanced. The fan housing shall be constructed of heavy gauge aluminum with a rigid internal support structure. The fan shroud shall have a rolled bead for added strength. Motors shall be heavy duty ball bearing type, carefully matched to the fan load, and furnished at the specified voltage, phase and enclosure. Motors and drives shall be mounted on vibration isolators, out of the airstream. Motors shall be readily accessible for maintenance. Precision ground and polished fan shafts shall be mounted in permanently sealed, lubricated pillow block ball bearings. Bearings shall be selected for a minimum (L50) life in excess of 200,000 hours at maximum of 150% of driven horsepower. A disconnect switch shall be factory installed and wired from the fan motor to a junction box installed within the motor compartment. Fans shall be furnished with backdraft dampers and shall be furnished with insulated roof curbs for installation by the General Contractor.

2.04 INSULATION

A. Provide duct insulation of the type hereinafter specified on the following: sheet metal ducts. All sealers, solvents, tapes, adhesives and mastics used in conjunction with this section of the specifications shall possess the maximum safety quantities available and Standards #90A and #90B. Insulation shall be fiberglass except as specified hereinafter having a minimum density of 3/4 pounds per cubic foot. Insulation shall be as manufactured by Owens/Corning Fiberglass Corporation, Armstrong, Johns-Manville or equal and installed in accordance with the manufacturer's recommendations.
HVAC

2.05 MOTOR STARTERS

A. Furnish and install all motor starters required for HVAC equipment under this section if not factory installed by the equipment manufacturer. The starters shall be wired by a licensed Electrician.

B. Motor Controls – Manual and Magnetic:

1. The individually mounted magnetic starters indicated on the plans and as required shall be magnetic across-the-line starters with thermal overload on each phase.
2. Starters shall be of the size and type required for particular motor horsepower and voltage. Minimum size starter to be Size 0.
   a. All starters shall have OL reset button, pilot light to indicate on or off and hand-off-auto switch in cover, unless indicated otherwise.
   b. All starters to have 120 volt control via individual control transformers fused on the secondary, where not fed at 120 volts.
3. Manual motor starters shall be furnished with thermal overloads on each phase. Thermal switches shall be provided with pilot lights.
4. Three (3) auxiliary contacts shall be furnished and installed in all motor starters (1 NC, 2 NO).
5. Motor starters shall be all manufactured by the same company and shall be one of the following: Square D Company, Allen Bradley, General Electric, Cutler Hammer or ITE.

2.06 DIFFUSERS, REGISTERS AND GRILLES

A. Provide all diffusers, registers and grilles indicated on the drawings. The units shall be of the size, type and style indicated on the drawings and as hereinafter noted. They shall be complete with the finishes and accessories hereinafter noted. Colors to be selected by the Architect. They shall be as manufactured by Titus, Price, Tuttle & Bailey or approved equal. Coordinate the location of supply, return and exhaust outlets with lighting plans. Contractor shall coordinate the border styles of the diffusers, registers and grilles with the architectural ceilings prior to submitting the shop drawings. Any discrepancies shall be brought to the attention of the Architect/Engineer.

B. Return registers shall be of steel construction with opposed blade dampers (no damper for transfer grilles), 35-degree horizontal fixed bars maintaining an effective area capacity of greater than 75% and baked enamel finish. TITUS Model 350RL or approved equal.

C. Supply air registers shall be double deflection and steel construction and integral opposed blade dampers. Registers shall be TITUS Model 300RL or approved equal.

2.07 GAS-FIRED UNIT HEATERS

A. Furnish and install, where indicated on plans, gas-fired unit heaters as made by Modine Model PDP or approved equal. All heaters are to have 80% thermal efficiency. Heat exchanger must consist of indirect-fired heat exchanger with dimpled tube pattern for efficient heat transfer.

B. All line voltage shall be completely enclosed in flexible conduit. Heaters shall be equipped with a 115/24 transformer. Factory installed relay and wiring shall permit the use of propeller fan for continuous air circulation when combined with
A fan time delay switch shall be provided and will be controlled by a low voltage thermostat.

C. Units shall be equipped with low voltage automatic reset high temperature controls wired to shut off the main gas valve and cause the heater fan to operate until limit resets.

D. All units and component assemblies shall be warranted for a period of one year from date of shipment from factory or 18 months from date of manufacture, whichever occurs first. All burners, heat exchanger, and draft diverters shall carry a ten-year non-prorated limited warranty on materials and workmanship (subject to appropriate disclaimers).

E. Heaters shall be equipped for use with natural gas and have a two-stage gas control and intermittent spark ignition with electronic flame supervision.

F. Unit shall be equipped with 115-volt, single phase, 60 Hertz current motors of the totally enclosed, fan cooled type including internal automatic reset thermal overload protection. Fans will be steel hubbed with aluminum blades and have complete fan-guard protection. Horizontal louvers shall be provided for directing air flow.

G. Units shall be provided with a factory installed integral power venting fan and sealed flue collector.

2.08 GAS MONITORING AND CONTROL SYSTEM

A. Furnish and install a complete gas monitoring and control system and all required accessories. The PolyGard® Series SPC3-1112 analog controller and remote sensor by INTEC Controls (a Relevant Solutions brand) shall be the basis of design, or approved equal. Contractor shall provide all sensors by one manufacturer.

B. Control Panel with Carbon Monoxide (CO) Sensor:

1. The controller shall provide continuous monitoring of the designated gas levels in the assigned area and control the ventilation system via the output relays of the SPC3 controller in accordance with all applicable codes and standards.

2. The controller shall have the ability to interface via binary outputs or one (1) 0/4-20mA /0/2-10 VDC selectable output to any compatible electronic analog control, DDC/PLC control or automation system.

3. The controller shall have a built-in electrochemical CO. The sensor shall have plug-in technology for ease of troubleshooting and replacement of the element. Solid state sensing devices shall not be acceptable.

4. The controller shall accept one (1) remote 4-20mA analog input from other remote devices such as an additional gas sensor/transmitter, temperature or humidity sensor.

5. The sensor range shall be factory set to 0-250 PPM Carbon Monoxide. The controller shall cover between 5,000 and 10,000 square feet of the area and placement shall be as shown on the drawings.

6. The sensor stability and resolution shall be ± 3 PPM of reading and shall have a repeatability of ± 3% of reading, with a response time of less than 50 seconds to a 90% step change. The long-term output drift shall not exceed more than 0.4% of signal loss per month. The permissible ambient working temperature shall be 14°F to 122°F and permissible ambient humidity of 15 to 95% RH, non-condensing. The sensor shall require no routine maintenance other than periodic calibration, and the life expectancy shall be 5 years under normal service. The manufacturer shall provide a 1-year warranty for materials and workmanship.

7. The control panel shall be powered by either 24VDC or 24VAC. The controller shall be capable of 4-stage control, assignable to up to two (2) relay outputs, one (1) 24 VDC switched output, (1) audible alarm and (1) 0/4-20mA /0/2-10 VDC selectable output assignable as low, high or average.

8. The control panel shall have a menu-driven keypad and status indicator LED’s located on the front; Flashing Orange = Low Alarm, Flashing Red = High Alarm, Yellow = Fault/Fail, Green = Power On. The controller shall have a manual reset for the audible alarm. The relays shall be selectable for latching or automatic reset.

9. The control panel shall include two (2) lines LCD display of 16 characters at a 1-digit resolution. The display shall show the status of all active sensors.

10. The controller shall be contained in a NEMA4X enclosure. The controller shall be installed on walls or columns approximately 5 feet above the floor or as shown on the drawings.

HVAC
23 00 00 - 11
11. The CO detection system shall be NRTL performance tested and certified to ANSI/UL 2075.

C. Nitrogen Dioxide (NO₂) Sensor/Transmitter:

1. The Nitrogen Dioxide sensor/transmitter shall provide monitoring of the Nitrogen Dioxide levels present in diesel exhaust in the Sally Port and control the ventilation system via the DDC/BA system in accordance with all applicable codes and standards.

2. The sensors shall be electrochemical type. The sensor/transmitter shall have plug-in technology for ease of troubleshooting and replacement of both the sensing element and the printed circuit board. Solid-state sensors or air sampling devices shall not be acceptable.

3. The sensor range shall be 0-10 ppm to 0-20 ppm Nitrogen Dioxide via calibration. A micro-processor-based transmitter shall generate a polarity protected, proportional 4-20 mA output signal. The wiring between the transmitter and the DDC/BA system shall be a 2-wire, twisted and shielded, 4-20mA, 17-28 VDC configuration. Each sensor/transmitter shall cover between 4,000 and 6,000 square feet of the garage floor and placement shall be applied strategically and appropriately per floor plan requirements.

4. The sensor shall have an accuracy and resolution of ±0.1 PPM of reading, repeatability of ±2% of reading, and a response time of less than 40 seconds to a 90% step change. The sensor drift shall not exceed more than 2% signal loss per month. The permissible ambient working temperature shall be 14°F to 104°F and the permissible ambient humidity shall be 15 to 95% RH, non-condensing. The sensor shall require no routine maintenance other than periodic calibration. Its life expectancy shall be 2 years of normal service. The manufacturer shall provide a two 2-year warranty for materials and workmanship, and a 12-month warranty on the sensing element under normal exposure.

5. The sensor/transmitter shall be RFI/EMI protected and contained in a NEMA 1 metal enclosure to prevent vandalism. The enclosure with the sensor/transmitter shall be installed on walls or columns approximately 1.5 ft. above the floor.

6. The sensor/transmitter shall have the capability of adding up to (2) relays as a separate component to the printed circuit board of the sensor.

7. The output signal from the sensor/transmitter shall be a direct input into the digital control building automation system. All sequences of fan and alarm control, including time delay functions to prevent hunting of ventilation fans shall be a part of the DDC/BA system.

8. If the level of NO₂ reaches 2 ppm, the low alarm shall activate. If the level of NO₂ increases to 5 ppm, the high alarm shall activate.

9. The contractor shall supply the PolyGard® Series AT-1130 NO₂ sensor/transmitter, by INTEC Controls, Inc.

C. Warranty: The manufacturer shall provide a 1-year warranty for materials and workmanship.

D. Calibration/Verification: Calibration shall not be necessary to verify system operation. The user shall verify operation by applying the appropriate test gas to the corresponding sensor. The calibration kit can be used for system verification or sensor calibration when required. The contractor shall provide one calibration kit per gas to be monitored and turn them over as part of their close-out documentation.

2.09 AUTOMATIC TEMPERATURE CONTROLS

A. General:

1. Furnish and install, as hereinafter specified, a complete electronic temperature control system as manufactured by Honeywell, SIEBE, Johnson, or approved equal.

2. The control system shall be installed by competent control mechanics and electricians regularly employed in the field of Automatic Temperature Controls. All control equipment shall be the product of one manufacturer.

B. Scope: The control system shall consist of all thermostats, automatic control valves, dampers and actuators, and other accessory equipment and a complete system of electrical wiring to fill the intent of the specification and provide for a complete and operable system. All control equipment shall be fully proportioning, except as noted otherwise.
C. Electric Wiring:

1. All electric wiring and wiring connections, either line voltage or low voltage, required for the installation of the temperature control system, as herein specified, shall be provided by the temperature control contractor, unless specifically shown on the electrical drawings or called for in the electrical specifications. The wiring installation shall be in accordance with National and local codes and with the electrical portion of these specifications. All wiring shall be run concealed wherever possible. Exposed wiring shall be run in raceways. Raceways shall be Wiremold 200 Series with all elbows, raceways, covers, mounting stops, box extensions and wiring for a complete and neat installation. 120-volt power shall be provided by the Electrical Contractor.

2. All wiring shall comply with the requirements of the electrical section of the specification.

D. Submittal Brochure: The following shall be submitted for approval:

1. Control drawings with detailed wiring diagrams, including bill of material and description of operation for all systems.
2. Data sheets for all control system components.

E. Instruction and Adjustment: Upon completion of the project, the control contractor shall:

1. Completely adjust, ready for use, all thermostats, damper operators, etc., provided under this section.
2. Furnish two (2) instruction manuals covering the function and operation of the control systems on the project for the use of the Owner's operating personnel. A competent technician shall be provided for instruction purposes.

F. Guarantee: The control system designated on drawings and plans and herein specified, shall be guaranteed to be free from original defects in both material and workmanship for a period of one (1) year or normal use and service, excepting damages from other causes. This guarantee shall become effective starting the date the owner begins to receive beneficial use of the system.

G. Programmed Maintenance:

1. Upon completion of the installation, the control contractor shall submit to the owner, an agreement to provide the necessary programmed maintenance to keep the various control systems in proper working condition.
2. This programmed maintenance agreement shall fully describe the maintenance work to be performed and shall advise the cost of this work during the guarantee period, as well as for subsequent years thereafter.

H. Equipment:

1. Room Type Instruments: Room thermostats for the rooftop unit shall be 7 day/24-hour programmable heating and cooling type. Thermostats for the unit heaters shall be manual heating only type. Provide impact lockable covers for thermostats.

a. Each room thermostat shall also include the following auxiliary devices:
   1) Heat/Cool option switch.
   2) Setpoint Adjustment.
   3) Temperature Indicator.
   4) Override Switch.

b. The setpoint adjustment shall allow for modification of the temperature by the occupant. Setpoint adjustment may be locked out, overridden or limited as to time or temperature by an authorized operator. Thermostats shall require a password to set the schedule by an authorized operator.

c. The temperature indicator shall be digital display and shall be visible without removing the thermostat cover.

d. The override switch shall initiate override of the night setback mode to normal (day) operation when activated by an authorized operator.
2. Dampers:
   a. Automatic dampers, furnished by the control contractor shall be single or multiple blade as required. Dampers are to be installed by the sheet metal contractor under the supervision of the temperature control contractor. All blank-off plates and conversions necessary to install smaller than duct size dampers are the responsibility of the sheet metal contractor.
   b. All damper frames are to be constructed of #13-gauge galvanized sheet metal and shall have flanges for duct mounting.
   c. Damper blades shall not exceed 6” in width. All blades are to be corrugated type construction, fabricated from two (2) sheets of #22 galvanized sheet steel, spot welded together. Blades are to be suitable for high velocity performance.
   d. All damper bearings are to be made of nylon. Bushings that turn in the bearings are to be oil-impregnated sintered metal.
   e. Replaceable butyl rubber seals are to be provided with the damper. Seals are to be installed along the top, bottom and sides of the frame and along each blade edge. Seals shall provide a tight-closing, low-leakage damper. Leakage and flow characteristic charts must be submitted to the engineer prior to approval of dampers.

3. Damper Operators:
   a. All damper operators shall be electric On/Off spring return type. They shall be quiet in operation and shall have ample power to overcome friction of damper linkage and air pressure acting on louvers to position dampers accurately and smoothly. The damper operator mounting arrangement shall be outside the airstream wherever possible. The actuators must be designed so that they may be used for either clockwise or counterclockwise fail-safe operation. Actuators shall be protected from overload at all angles of rotation.
   b. The operators shall be capable of operating at varying rates of speed to correspond to the dictates of the controllers and variable load requirements. The operators shall be capable of operating in sequence when required by the sequence of the operation. The operators shall have external adjustable stops to limit the stroke in either direction. The operator linkage arrangement shall be such as to permit normally open or normally closed position of the dampers as required.
   c. All damper operators mounted on modulating dampers are to have pilot positioners of the fully relay type with an interconnecting linkage to provide mechanical feedback so as to provide accurate positioning and control.
   d. The ATC Contractor shall furnish and install damper operators for the automatic dampers in air handling units.

4. Two Speed Control: Provide a 2-speed control for exhaust fan EF-1. Two speed control shall be a Greenheck, Vari-Green Control specifically designed to allow the Vari-Green Motor to operate at two discrete speeds. Two speed control shall include two dials that may be set at any point between 0 and 10 volts DC and an integral transformer capable of reducing 115/208-240 volt AC power to 24 volt AC power.

5. Miscellaneous Devices: Provide all the necessary relays, cumulator, temperature and humidity sensors, transformers, etc., to make a complete and operable system.

I. Sequence of Operation:
   1. Exhaust Fan (EF-1): Exhaust fan EF-1 shall be controlled by the 2-speed controller and the gas monitoring and control system. The 2-speed controller shall interface with the gas monitoring and control system to comply with the intended sequence of operation of the ventilation system. Provide all required control components for a complete operable system. The 2-speed controller shall operate the exhaust fan continuously at low speed at all times. Upon detection of gas (CO/NO₂) by the gas detection system at a low-level setpoint the gas detection system shall go into a warning stage and shall send a signal to the exhaust fan and the associated motorized outdoor air intake damper. The intake damper shall prove to be open and the 2-speed controller shall switch to the high-speed setpoint on the fan. If the gas is still detected at the high-level setpoint of the gas detection system, the gas detection system shall go into the alarm stage and the visual strobe and audible horn shall be activated. Once
the ventilation equipment has cleared the gas and the sensors detect lower levels the systems reset and go back to monitoring the space.

2. Unit Heaters: The gas-fired unit heaters shall be controlled by a wall mounted thermostat.

PART 3 - EXECUTION

3.01 MATERIALS AND WORKMANSHIP

A. All specified materials and equipment shall be furnished new and free of defects.

B. Store all equipment and materials in a clean, dry place to preserve initial quality.

C. Protect installed materials and equipment against damage and corrosion. All equipment shall be left in a first-class condition. The Architect shall determine the adequacy of equipment condition and appearance and it shall be the responsibility of this Contractor to rectify any deficiencies. This shall include, but is not limited to furnishing and applying paint in accordance with the manufacturer's recommendation.

D. All work shall be installed in a first-class manner consistent with the best current trade practices. All devices, materials and equipment shall be securely installed plumb and/or level.

3.02 PROTECTION AND CLEANUP

A. Protection:
   1. Be responsible for the maintenance and protection of all material and equipment furnished during all phases of construction from loss, damage or deterioration until final acceptance by the Owner.
   2. All materials and equipment on the job site shall be suitably stored and protected from the weather.
   3. During the progress of the work all pipes, ducts and equipment openings shall be temporarily closed so as to prevent obstruction and damage.

B. Cleanup:
   1. After installation, equipment with factory finished surfaces shall be cleaned and damaged spots touched up with the same type paint applied at the factory.
   2. Keep the job site free from accumulation of waste material and rubbish, construction equipment and surplus materials from the site and leave the premises in a clean condition.

3.03 SYSTEM START-UP AND OPERATION

A. After completion of the installation and before acceptance by the Owner, this Contractor shall start-up, operate and thoroughly check the entire HVAC system to assure complete adherence to the design intent.

B. It is intended that the start-up/operational endeavor shall conclusively establish that all systems are functioning properly with respect to rotation of equipment, wiring interlocks, control interlocks and sequential control.

C. Should any portion of system performance be found to be contrary to the specified intent, same shall be corrected as required, at no cost to the Owner.

D. After completion of the system check procedure and when the Contractor is firmly convinced that all systems are performing properly and efficiently, he shall submit in writing to the Architect a certified statement to that effect.

3.04 SYSTEMS IDENTIFICATION
A. All items of mechanical equipment including but not limited to GUH and exhaust fans shall be identified by approved nameplates provided by this Subcontractor.

1. The nameplates to be aluminum 2-1/2" x 3/4" with a black background with etched or engraved natural aluminum lettering. The nameplates shall bear notations corresponding to the same unit notations indicated on the design drawings.
2. All equipment nameplates shall be conspicuously visible externally.

3.05 SAFETY PRECAUTIONS

A. Furnish, place and maintain proper guards for the prevention of accidents and any other necessary construction required to secure safety of life and property. Conform to all OSHA requirements.

3.06 SUPPLEMENTARY STEEL, CHANNELS AND SUPPORTS

A. Furnish and install all supplementary steel, channels and supports required for the proper installation, mounting and support of all equipment. Method of attachment to the building structure shall be in a manner approved by the Architect. Type and size of supports shall be determined by the Contractor and shall allow only a minimum amount of deflection.

B. All supplementary steel and channels shall be installed in a neat and workmanlike manner parallel to the walls, floor and ceiling construction. All turns shall be made with 90 degree and 45 degree fittings, as required to suit the construction and installation conditions.

3.07 TESTING, BALANCING AND CLEANING

A. This Contractor shall engage a Certified Balancing Contractor to balance and adjust the new steam and air systems, using methods and procedures which have been developed and employed to accomplish this service.

B. Air System Balancing and Cleaning:

1. Before the systems are tested and balanced, all ducts and equipment shall be thoroughly cleaned so that no dirt, dust or other foreign matter will be deposited in or carried through systems. All filters shall be renewed after air handling systems have been cleaned.
2. Each air supply, return and exhaust system shall be balanced to deliver within 10% the air quantities specified on the drawings.
3. Submit to the Architect six copies of the complete air balancing report. Air balancing report shall include for each fan system the fan size, make, model, fan and motor RPM, delivered amperage, CFM, fan static pressures and CFM at each air inlet and outlet.
4. Final air quantities shall be achieved by adjusting fan outlet dampers and fan RPM. Final damper settings shall be permanently marked after air balance report.

END OF SECTION
SECTION 26.00.00

ELECTRICAL

PART 1 – GENERAL

1.01 GENERAL

A. The Conditions of the Contract and other sections of Division 1, General Requirements, apply to work of this Section.

1.02 WORK TO BE PERFORMED

A. The scope of work under this Section, without limiting the generality thereof, includes the furnishing of all labor, materials, equipment, services and incidental necessary to complete all of the Work in accordance with the Contract Documents which are intended to describe and provide for a finished piece of Work, and are to be cooperative; what is called for by either shall be complete in every detail, notwithstanding whether or not every item necessarily involved is particularly mentioned.

B. Electrical Work shall generally consist of, but not be limited to:
   1. Obtain all permits and inspections and pay all fees;
   2. Selective demolition of items as noted or shown;
   3. Provide all wire and cable, connectors and connections;
   4. Provide all raceways, fittings and supports;
   5. Provide all device, pull, outlet and junction boxes;
   6. Provide all wiring devices and plates;
   7. Provide all safety disconnect switches as shown;
   8. Provide all circuit breakers as shown or scheduled;
   9. Provide all lighting fixtures and lamps as scheduled or specified;
  10. Provide all fire detection and alarm equipment, devices and ancillary devices as required;
  11. Testing, training, commissioning and demonstration of all systems;
  12. Record Drawings;
  13. Operation and Maintenance Instruction and Manuals;

C. All permit and inspection fees shall be paid for by the Contractor.

D. Be prepared for, and accommodate work-arounds, given the likelihood that the Contractor will not be able to access some portions of the building at some times. It is expected that the Contractor will then work in other areas of the Project. Required work-arounds shall not be the basis of any claim for additional compensation.

E. Restore to match surrounding surfaces any area disturbed or exposed by the Work of this contract.

F. Perform work and provide material and equipment as shown on Drawings and as specified or indicated in this Section of the Specifications. Completely coordinate work of this Section with work of others and provide a complete and fully functional installation. Drawings and Specifications form complimentary requirements; provide
work specified and not shown, and work shown and not specified as though explicitly required by both. Although work is not specifically shown or specified, provide supplementary or miscellaneous items, appurtenances, devices and materials obviously necessary for a sound, secure and complete installation. Remove all debris caused by contractors' work.

G. Drawings are diagrammatic and indicate general arrangement of systems and work included in Contract. It is not intended to specify or to show every offset, fitting or component; however, Contract Documents require components and materials whether or not indicated or specified as necessary to make the installation complete and operational.

H. As work progresses and for duration of Contract, maintain complete and separate set of prints of Contract Drawings at job site at all times. Record work completed and all changes from original Contract Drawings clearly and accurately, including work installed as a modification or addition to the original design. Indicate actual circuiting, light fixture locations, device outlet locations, switch assignments, loadcenter schedule, etc.

1.03 RELATED WORK SPECIFIED UNDER OTHER SECTIONS

A. The following items of work are specified and included under other sections of the specifications:
   1. Section 23.00.00 Heating, Ventilating, Air Conditioning

B. Painting of electrical conduits, pull boxes, hangers, panelboard doors and trim, and all other electrical equipment, to match the surrounding finish as directed by the Architect, shall be done by the Painting Subcontractor.

C. All electric motors shall be furnished and set in place by the trade requiring same and shall be wired by the Electrical Subcontractor.

D. All control devices including starters, thermostats, pneumatic-electric switches, electric-pneumatic switches, aquastats and alternators required for the automatic temperature control system shall be furnished and installed under the Heating, Ventilating and Air Conditioning Section of the Specifications unless otherwise indicated on the electrical drawings.

E. All automatic temperature control wiring and raceways, including wiring all control devices shall be provided under the Heating, Ventilating and Air Conditioning Section of the Specifications unless otherwise indicated on the electrical drawings.

F. All temporary power shall be provided by the General Contractor.

G. All removal and disposal of demolished electrical items shall be provided by the General Contractor.

H. All cutting and patching required for the electrical work shall be provided by the General Contractor.

1.04 SUBMITTALS

A. Submit shop drawings and manufacturer's product data in accordance with the provisions of the General Conditions. Submit quantity of copies as requested.

B. List of material and equipment requiring shop drawings shall include, but is not limited to:
   1. Wire and Cable
   2. Wire and Cable Connectors and Devices
   3. Raceways
   4. Boxes
5. Wiring Devices
6. Disconnect Switches
7. Circuit Breakers
8. Lighting Fixtures
9. Fire Alarm System Devices

C. Submittals shall be indexed from list above. Add additional items to end of list. Check, stamp and mark with project name shop drawings and product data before submitting for approval. Specifically indicate on shop drawing transmittal form or by separate letter any deviations from Contract Documents because of standard shop practice or other reason. Cross out, but do not obliterate, material not intended for inclusion in the Work. Clearly indicate material to be included in the Work.

D. Submit for approval all materials incorporated in the Work. Installation of material which is not approved shall be at the risk of the Contractor, and the Owner may order that it be removed and/or replaced.

E. Submit samples of any material or equipment requested, prior to approval.

F. The Engineer will review one initial submittal, and one re-submittal of any item. If review, of re-submittals beyond the first re-submittal are required; the Contractor shall bear the Engineer’s cost to review the re-submittal. If materials which have previously been approved or approved-as-noted are re-submitted, the Contractor shall bear the Engineer’s cost to review the re-submittal.

1.05 CODES, ORDINANCES AND PERMITS

A. All Work shall be done in strict accordance with the Codes, rules and regulations governing electrical work in the City of New Bedford, and the Commonwealth of Massachusetts, and the Massachusetts Electrical Code. If there is any conflict between plans or specifications and such rules and regulations, the rules and regulations shall take precedence.

B. The publications and/or standards listed below form a part of this specification. The publications are referenced in text by the basic designation only.

1. National Fire Protection Association (NFPA) - USA:
   a. No. 70 National Electrical Code (NEC)
   b. No. 72 National Fire Alarm Code

2. Commonwealth of Massachusetts
   a. 527 CMR 12.00 Massachusetts Electrical Code
   b. 780 CMR Massachusetts State Building Code, 8th Edition and it’s reference standards
   c. 521 CMR Massachusetts Regulations of the Architectural Access Board

C. Perform work strictly as required by rules, regulations, standards, codes, ordinances, and laws of local, state, and federal government, and other authorities that have lawful jurisdiction.

D. Give notices, file plans, obtain permits and licenses, pay all fees and obtain all necessary approvals from authorities that have jurisdiction. Deliver all certificates of inspection to the Architect. No work shall be covered before examination and approval by the Authority Having Jurisdiction. Replace any imperfect or condemned work with materials conforming to the requirements, and satisfactory to the Architect, without extra cost to the Owner. Contractor is responsible to obtain all permits and pay all fees.
E. Where the Engineer is to witness testing or inspections, provide not less than seven (7) calendar days notice to the Engineer of such inspections or testing.

F. Where the local Authority Having Jurisdiction (AHJ) requires work which is not included in the Contract, and where such work will result in an added cost to the Owner, the Contractor shall obtain such requirement from the AHJ in writing. Such requirements shall be supported by applicable code, ordinance or law citation(s), or other justification, to the full satisfaction of the Owner.

1.06 INSPECTION OF SITE

A. Prior to submitting a bid, the bidder is advised to with prior arrangement with the Owner, visit the site (See Advertisement for site date) and shall at that time, inspect all existing conditions to ascertain the exact scope and nature of the work that is required under this Contract, how it relates to existing work to remain and all job conditions and restrictions.

B. Bidders are advised to visit the site and inform themselves as to conditions under which this work will be performed, prior to submitting prices. Failure to do so will, in no way relieve the successful bidder from the responsibility of furnishing any materials or performing any work in accordance with the true intent of the Drawings and Specifications.

C. No claim for extra compensation will be recognized if difficulties are encountered which an examination of the site conditions, Drawings and Specifications prior to executing the Contract would have revealed.

1.07 STORAGE AND REMOVAL OF MATERIALS

A. Provide suitable containers on-site for storage of materials, or store material off-site. Type and location of containers shall be subject to the approval of the Engineer.

B. The General Contractor shall provide suitable containers for all demolition and waste materials generated by this work.

1.08 CHANGES IN THE WORK

A. Any addition, deletion or change in the work which affects the contract sum will be addressed via a change order. This contractor may be noticed to proceed with the work while the change order paperwork is being processed via a bulletin, construction change directive, or other document.

B. In addition to any requirements listed in other sections of the contract, any proposals shall be fully supported by documentation of costs, including material quantities and unit costs, labor units, labor rates and any mark-ups in accordance with the contract. Any sub-contractor proposals shall be similarly detailed. Material unit costs shall be based on the proposer’s actual costs, which shall be documented by vendor quotes, invoices or other upon request. Material prices from estimating or pricing guides will not be accepted. Material prices which are in excess of the retail costs of materials in the area will not be accepted.

C. Any change order proposal shall also state the impact, if any, on the contract duration. If no such statement is made, the contract duration will remain unchanged.

D. The proposer shall bear the costs associated with reviewing, documenting and processing any change orders which are the result of a failure to properly carry out the work, or other proposals which are 1) not requested by the Owner, Architect or Engineer, or 2) are not the result of differing conditions.
1.09  SAFETY

A. The General Contractor and this Contractor shall be jointly responsible for all safety on the Project. This shall include safety to the workers, Tenants, the Engineer and Owner and their respective employees. The Contractor shall develop and implement all safety programs required by mandated and industry standard regulations.

PART 2 – PRODUCTS

2.01  GENERAL

A. Products furnished shall be designed and approved for the intended use, shall meet all requirements of the Massachusetts Electrical Code (MEC), and local codes, shall be manufactured in accordance with the standard indicated, and shall meet the requirements specified in the Contract Documents. Materials and equipment shall be listed by a nationally recognized testing laboratory.

B. All material incorporated in the Work shall be new and unused. Samples of any material or item shall be furnished upon request of the Engineer, prior to approval.

C. All products shall be rated for and approved for use in the application shown, regardless of any notations on the plans. Equipment located outdoors or in wet locations shall be weatherproof, and/or enclosed in suitably rated enclosures. All equipment shall be rated for the current, voltage and phases at which they are applied.

D. All workmanship shall be of the highest quality, as determined by the Engineer. The Contractor will be required to repair or replace all Work which is not of the highest quality and workmanship.

E. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

F. It is the intent of the Specifications that one manufacturer be selected, not a combination, for any particular classification of material. For example, all wire of one manufacturer, all switches of one manufacturer, etc.

G. Where materials, equipment, apparatus, or other products are specified by manufacturer, brand name, type or catalog number, such designation is to establish standards of performance, quality, type and style.

H. The Electrical Contractor shall be responsible for ordering and furnishing the correct quantity of material required. Routing and equipment arrangements shown on the drawings are approximate only and are not warranted to be accurate.

I. Each and all items of the Fire Alarm System shall be listed as a product of a single fire alarm system manufacturer under the appropriate category by Underwriters Laboratories, Inc. (UL), and shall bear the "UL" label. All control equipment shall be listed under UL category UOJZ as a single control unit. Partial listing shall not be acceptable.

J. Peripheral devices connected to or associated with the fire alarm control panel shall be compatible with, and listed for use with the fire alarm control panel provided.

2.02  WIRE AND CABLE

A. General

1. Minimum wire size shall be No.14 AWG.

2. All conductors shall be annealed copper, 98% conductivity, Class B stranding, except No.10 AWG and smaller diameter may be solid.
3. Aluminum conductors are not allowed.
4. Minimum sizes shall be No. 12 AWG for power and lighting and No. 14 AWG for control.
5. Conductors shall be identified (colored) as required by the MEC.
6. Wire and cable in underground ducts shall be approved for use in wet locations.
7. Wire and cable shall be manufactured by General Cable Co., American Wire, Okonite, or approved equal.

B. NEC Type THWN/THHN: UL 83
   1. Conductors for power, lighting, grounding and control; above grade; No. 14 AWG through No. 8 AWG; shall be NEC type THWN/THHN.

C. NEC Type MC: UL 1569, with full size grounding conductor, and steel or aluminum interlocked armor sheath.
   1. Metal-Clad cable shall have full size green grounding conductors.
   2. Metal-Clad cable shall be used in concealed locations only. Concealed locations include above ceilings and within dry wall partitions.
   3. Metal-Clad cable shall be used in dry locations only.
   4. Metal-Clad cable shall be used in all areas of assembly and immediately adjacent areas.

D. NEC Type FPL: UL listed, 14 gauge, 2 conductor, solid with overall red jacket.

2.03 WIRE AND CABLE CONNECTORS AND DEVICES
A. Wire and Cable Connectors and Devices: UL 486.
B. Ground conductors of # 14, 12 and 10 AWG shall be made up using only green wire nuts with grounding pigtail provisions.

2.04 RACEWAYS
B. Electrical Metallic Tubing (EMT): UL 797. Fittings – compression one inch and below, set screw over one inch. Pre-painted raceways are not acceptable.
C. Flexible Metallic Conduit (FMC): UL 1.
D. Liquid-tight Flexible Metallic Conduit (LFMC): UL 360. Use for connections at exterior mounted equipment, or other location exposed to weather or wet conditions.
E. Fittings for metallic raceway shall be steel. Connectors for EMT, FMC, LFMC shall have insulated throat.
F. Steel supports or racks shall be galvanized steel channel and fittings. Supports shall be manufactured by Unistrut, Kindorf, Husky Products Company, or approved equal. Steel support rods or support bolts for conduits shall be 1/8” diameter for each inch or fraction thereof of diameter of conduit size, but no rod or bolt shall be less than 1/4” in diameter.
G. All required fittings, offsets and bends required shall be provided to route the conduits from source to destination, whether these are shown on the plans or not. Contractor shall/may arrange conduits as required to avoid obstructions, and account for field conditions. Provide all supports as required by the National Electrical Code.
H. Wireways shall be painted steel trough with screw mounted covers fabricated from a minimum of 14 gauge steel with ANSI grey polyester coating over phosphatized surfaces, inside and outside. Wireways shall be sized as required. Wireways shall be furnished without knockouts.

2.05 BOXES

A. Outlet Boxes: UL listed, NEMA OS 1, with marked volume. Size boxes in accordance with volume requirements of MEC.

B. Outlet boxes shall be specifically designed for the construction encountered, with suitable supports and attachments.
   1. Outlet boxes shall be metallic, in gangs and configurations to suit the application, with suitable wire/cable clamps as required. Outlet boxes shall be flush mounted in all finished areas. Ceiling outlet boxes shall be listed and rated for support of light fixtures up to 50 pounds.
   2. Surface mounted outlet boxes shall be specifically designed for the construction encountered, with suitable supports and attachments. Outlet boxes shall be metallic, in gangs and configurations to suit the application. Outlet boxes may be surface mounted in unfinished areas.

C. Pull boxes shall be code gauge sheet steel, painted, with screw covers. In wet, exterior or basement areas, provide galvanized sheet steel boxes, with gasketed cover. Where dimensions are shown, these are based on no splices. Increase dimensions as required if splices are provided in pull boxes.

D. Where required, provide outlet box extensions to bring front of outlet box flush with mounting surface, per MEC 314.22.

E. Junction boxes shall be of size and type to accommodate (1) structural conditions, (2) size and number of raceways, conductors or cables entering, splices, and (3) devices or fixtures for which required.

F. Special care shall be taken to set all boxes correctly square and true with the building finish. Junction boxes and accessories shall be as manufactured by Steel City, Appleton, Raco, or approved equal.

2.06 WIRING DEVICES

A. Switches:
   1. Single pole, three way or 4 way as required, 20A, 120/277 volt, heavy duty, quiet commercial specification grade, self-grounding with green ground screw. Provide lock switch with removable key where indicated on plans.
   2. Switches shall be colored as selected by the Architect, with matching color device plate.

B. Receptacles:
   2. Receptacles shall be colored as selected by the Architect, with matching color device plate.
   3. Ground Fault Circuit Interrupter (GFCI, GFI) duplex, 20 amp, 120 volt, specification grade, 5 mA sensitivity/trip, Class A, with pilot light. GFCI receptacles shall include self-test feature, and comply with UL 943 edition in effect at time of permitting. Where non-GFI receptacles are mounted in common view with GFI receptacles, provide “designer” type receptacle to match appearance of GFI receptacle.
   4. Receptacles located in exterior, damp or wet locations shall be listed as weather resistant.
   5. Receptacles located in exterior or wet locations locations shall be GFI type.
C. Device Plates:
   1. Device plates shall be brushed stainless steel, one piece, single or multi-gang type selected to match the
device or combination of devices. So-called “goof” plates are not allowed.
   2. Weatherproof receptacle plates/covers shall be metallic, pad-lockable rated ‘weatherproof while in use’.

D. Locations of all receptacles and switches to be reviewed with Architect prior to rough-in. Coordinate light switch
locations with doors as installed, and install switches on latch side of door. Adjust locations as required, without
cost. Provide three way switching for lighting at rooms with multiple entries, and at top and bottom of all stairs.
Layout and locations of all switching must be confirmed with Architect and Owner prior to rough-in.

E. Wiring devices shall be manufactured by Pass & Seymour/Legrand, Hubbell or Leviton.

2.07 DISCONNECT SWITCHES

A. Manual starter shall be a toggle type switch with overload protection, designed for use on motor circuit. Provide
   enclosure suitable for area installed.

2.08 CIRCUIT BREAKERS

A. Circuit breakers shall be compatible with and listed for use in the existing panelboards provided, and shall be as
   manufactured by the manufacturer of the existing panelboard.

B. Circuit breakers shall be quick-make, quick-break molded case type in amperes and poles to suit, or as called for
   on the Drawings. Where serving lighting circuits, provide switch duty (SWD) rated circuit breakers.

C. Circuit breakers shall be toggle type, manually operated, trip free with simultaneous opening/closing of all
   common poles. Trip units shall be thermal-magnetic type.

2.09 EXISTING DISTRIBUTION EQUIPMENT

A. Where connections are made in existing panelboards or other distribution equipment, the panel index shall be
   revised to indicate the new loads served. All existing panelboards that do not have a circuit directory card
   mounted in a frame with noncombustible plastic cover shall have one installed on the inside of the door. All
directory cards shall be properly filled in, using a typewriter, and indicate areas and devices served by each unit.
   Where spares or spaces are provided, mark these designations in pencil by hand.

B. New circuit breakers, disconnects, starters, etc. added to existing equipment shall be the same frame size and
   interrupting capacity as existing panelboards and circuit breakers. New circuit breakers installed in existing
   panelboards shall be listed as fully compatible with the panelboard.

2.10 LIGHTING FIXTURES

A. Provide lighting fixtures, equipment and components where shown on Drawings, and as specified, wired and
   assembled. Provide approved connectors, fittings, and other appurtenances as required.

B. Provide all fixtures with light source as scheduled. Scheduled fixtures indicate the type, finish and quality required.

C. LED lighting shall be Energy Star compliant designed in accordance with ANSI C78.377. Provide UL recognized
   LED drivers designed to UL8750 standard.

D. Electronic ballasts, LED lamps, modules and drivers shall be designed to NEMA 410 standard.
E. Fixtures shall be complete with light source of the type noted in schedules and shall have metal parts, glassware, plastic diffusers, etc., free from scratches, cracks, and other defects. Any items damaged during shipment, handling, or installation shall be replaced without expense to the Owner.

F. Provide exit signs and emergency battery unit equipment as shown and scheduled. Circuit remote heads to battery units shown. Maintain separation of all emergency system wiring. All wiring from remote heads to be #10 AWG. Balance remote heads on battery units shown. Circuit exit signs and unit equipment to lighting branch circuits serving the space.

G. Fixture mounted photocell shall be twist-lock with matching receptacle. Building mounted photocell shall be heavy duty spec grade, gasketed die cast housing and base with slide light adjustment and ½” conduit mounting. Operating voltage shall be compatible with control circuit.

2.11 FIRE ALARM SYSTEM

A. The existing FACP located in the main lobby is a ESL 1500 series conventional FACP. New devices shall be listed compatible with the existing FACP.

B. Pre-inspection: Prior to ANY work on the existing fire detection and alarm systems, the Contractor shall perform a 100% test/inspection of the existing system. This test shall document the condition of the existing system. The test shall be witnessed by the Owner’s representative, and a complete pre-inspection report prepared and submitted within 24 hours of the pre-inspection. Any defective devices or other system anomalies shall be brought to the attention of the Owner’s representative at that time, and noted on the pre-inspection test report. The Contractor shall be responsible for the proper operation throughout the construction period for all devices which are operational at the time of the pre-inspection.

C. Provide all wiring, peripheral devices and programming, as required to connect new devices to existing notification appliance circuits (NAC), initiating device circuits (IDC) and to operate the equipment associated with the devices.

D. Power Supply:

1. Where the main control panel does not have adequate simultaneous power capacity to power all devices, including audio-visual devices, door holders, sounder bases, relays, bells, etc. the power shall be increased as required by adding modular expansion power supplies. Where required, provide power supply(ies) and a 120 volt branch circuit(s) using specified wiring methods. Expansion power supplies shall be located in accessible locations, as approved by the Architect.

2. Positive-Temperature-Coefficient (PTC) thermistors, circuit breakers, or other over-current protection shall be provided on all power outputs. The power supply shall provide an integral battery charger for use with batteries up to 60 AH or may be used with an external battery and charger systems. Battery arrangement may be configured in the field.

3. The power supply shall provide a supervised battery and charger for standby power. Batteries shall be sealed Gel-Cell type, 12 volt nominal. Battery shall have sufficient capacity to power the system for not less than sixty (60) hours plus fifteen (15) minutes of alarm upon a normal AC power failure. The batteries are to be completely maintenance free. Fluid, level checks, refilling, spills and leakage shall not be required.

4. The power supply shall operate on 120 VAC, 60 Hz.

5. The power supply shall continuously monitor all field wires for earth ground conditions.

6. All circuits shall be power-limited, per UL 864 requirements.

7. Provide a smoke detector above all control equipment including control panels, and power supplies.

E. System Peripheral Components:
1. Audible appliances, common areas: Electronic sounders shall operate on 24 VDC nominal. Electronic sounders shall have a three pulse temporal pattern, with an output sound level of at least 90 dBA measured at 10 feet from the device. The Contractor shall measure and set the sound pressure level (SPL) in db, A weighted, to meet the code requirement for the area(s) served, and as required by the local AHJ.

2. Strobe Unit: shall meet the requirements of the ADA, UL Standard 1971 and shall meet the following criteria:
   a. The maximum pulse duration shall be 2/10 of one second.
   b. Strobe intensity shall meet the requirements of UL 1971.
   c. The flash rate shall meet the requirements of UL 1971.
   d. Strobes shall be multi-candela rating.
   e. Strobes shall be synchronized where required.
   f. Where located in straight corridors, strobes may be set at 15 candela setting. Where located at corridor intersections and all other areas not otherwise noted, strobes shall be set at 75 candela or greater.

3. Provide combination horn/strobes units, meeting the requirements above, where indicated on the plans.

4. Manual Pull Stations: shall be double action, non-coded, non-breakglass type, equipped with key reset. Stations must be designed such that after an actual activation, they cannot be restored to normal except by key reset. An operated station shall automatically condition itself so as to be visually detected, as operated, at a minimum distance of 100 feet, front or side. Manual stations shall be constructed of high impact Lexan, with operating instructions provided on the cover. The word FIRE shall appear on the manual station in letters one half inch in size or larger. Reset key shall match the control panel key.

5. Smoke Detectors, Conventional, photoelectric: System Sensor 2W-B.

**PART 3 – EXECUTION**

**3.01 MATERIALS AND WORKMANSHIP**

A. Work shall be executed in workmanlike manner and shall present neat, rectilinear and mechanical appearance when completed. Maintain maximum headroom at all times. Do not run raceway exposed unless shown exposed on drawings. Material and equipment shall be new and installed according to manufacturer's recommended best practice so that completed installation shall operate safely and efficiently.

B. Contractor shall review installation details of all electrical equipment in public areas with the Architect and cooperate fully with the Architect in this regard. Any work installed which is not reviewed with and approved by the Architect is subject to re-work at no increase in contract price.

C. All workmanship shall be of the highest quality, as determined by the Engineer. The Contractor will be required to repair or replace all Work which is not of the highest quality and workmanship.

D. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

E. Conductor fasteners shall be tightened with a torque tool in good condition to factory specifications. At time of inspection, torque tool(s) shall be available to demonstrate proper torque.

**3.02 DEMOLITION**

A. Demolish the existing systems to allow installation of the new systems. No components, items or materials are to be re-used, unless specifically noted herein. All demolition material shall become the property of the General
Contractor, for his lawful disposal, except any material which the Owner may salvage. Equipment to be turned over to the Owner as salvaged shall be moved to on-site storage as directed by the Owner.

3.03 CONTINUITY OF SERVICES

A. Do not interrupt existing services without Owner’s and Architect’s approvals.

B. At any time when the existing fire alarm system is being worked on, or is taken off line for any reason, notify the Housing Authority and the Local Fire Department.

3.04 TESTING, INSPECTION AND CLEANING

A. Test wiring and connections for continuity and grounds before fixtures are connected; demonstrate insulation resistance by megger test as required. Insulation resistance between conductors and grounds for secondary distributions systems shall meet NEC requirements.

B. Verify and correct as necessary: voltages, tap settings, trip settings and phasing on equipment from secondary distribution system to points of use. Test secondary voltages at loadcenters, and at other locations on distribution systems as necessary. Test secondary voltages under no-load and full-load conditions.

C. Test lighting fixtures with specified lamps in place for 10 hours. Do not operate lamps other than for testing before final inspection by Architect. Replace lamps that fail within 90 days after acceptance by Engineer within Contract Price.

D. Provide necessary testing equipment and testing.

E. Failure or defects in workmanship or materials revealed by tests or inspection shall be corrected promptly and retested until satisfactory results are achieved. Replace defective material.

F. Final Inspection
   1. At the final inspection, a factory-trained representative of the manufacturer of the major equipment shall demonstrate that the systems function properly in every respect.

G. Clean panels and other equipment. Panelboard interiors shall be cleaned and vacuumed. Equipment with damage to painted finish shall be repaired to Architect’s satisfaction.

H. After completion of project, clean the exterior surface of equipment included in this section.

3.05 WARRANTY

A. Materials provided under this section shall be warranted against defects in materials and workmanship by the Contractor for not less than one (1) year from the date of substantial completion.

B. The contractor shall respond to the site to address any warranty contact from the Owner within 48 hours. If the defective item can be repaired, it shall be repaired within 48 hours. Repairs shall be to the full satisfaction of the Owner, and repairs which render an item in a condition less than new will not be accepted. If the item cannot be repaired within 48 hours, it shall be replaced within 48 hours. If the item cannot be repaired or replaced within 48 hours, the contractor shall provide such temporary work as directed by the Owner to address the issue until such time as the issue is permanently addressed. If the issue appears to be across all same or similar products, the contractor shall be prepared to address (repair or replace) the remaining items.
3.06 OPERATION AND MAINTENANCE MANUALS

A. The following information shall be submitted for record purposes at project closeout:
   1. Final as-built drawings and information for items listed in this paragraph
   2. Wiring diagrams
   3. Installation information
   4. Signed Permits/Certificate of Inspection
   5. Warranties.

B. Two (2) Operation and Maintenance Manuals shall include the following information: one copy of all approved submittals, Instruction books and/or leaflet, recommended renewal parts list and list of local distributors who service installed system. O&M manuals shall be bound in properly sized, indexed and tabbed 3-ring binders, with front and edge labeling.

C. INSTRUCTION: Provide instruction as required to the building personnel and fire and safety personnel. "Hands-on" demonstrations of the operation of the system shall be provided.

3.07 ACCESS AND ACCESS PANELS

A. Provide proper access to material or equipment that require access, inspection, replacement, repair or service. If proper access cannot be provided, confer with Engineer as to best method of approach to minimize effects of reduced access.

3.08 FIRE BLOCKING AND STOPPING

A. Provide all materials and labor to penetrate or remove and re-install existing fire blocking, or re-route wiring to avoid fire blocking.

B. Provide fire stopping for all electrical conduits which enter or pass through fire rated walls or floors. Materials and methods of fire stopping shall be approved by UL. Fire seal fittings shall be used around cable, in sleeves, or in core drilled holes passing through fire rated walls and floors. Fire stopping shall be T&B Fire-Seal, O.Z. Gedney, Minnesota Mining and Manufacturing Company or approved equal.

3.09 WIRING METHODS

A. Install wire and cable in approved raceways as specified and as approved by authorities that have jurisdiction.

B. Surface metal raceways shall not be used unless explicitly specified and shown on Drawings, or approved in advance by the Engineer. Do not use surface raceways on floor. Surface raceways shall be secured to the mounting surface using concealed means. Use only fittings provided by the manufacturer of the raceway system provided. Use of surface metal raceways, where approved, in lieu of cutting, fishing wiring, patching and painting, shall not be the basis of any claim for additional compensation.

C. Wiring methods shall be as follows:
   1. Interior, finished, dry locations, concealed – EMT or Type MC Cable.
   2. Interior, finished, dry locations, exposed – None (conceal wiring methods).
   3. Interior, mechanical, electrical or other utility spaces, exposed – EMT or RMC.
   4. Interior, wet locations – RMC.
   5. Exterior, above grade – RMC.
D. Only the best possible workmanship for type MC cable installation shall be accepted. Type MC cable which is not properly supported, neatly installed, or bundled shall be removed and replaced at no additional cost. The acceptability of Type MC cable installation shall be solely the determination of the Engineer.

E. Install wiring methods in accordance with requirements for an assembly use group for such areas.

F. Provide flexible conduits for connections to electrical equipment and to appliances and equipment that are subject to movement, vibration or misalignment; where equipment connections dictate; and where noise transmission must be eliminated or reduced.

G. All conductors shall be installed in raceways, or fished in, or run in attic spaces, as required by the NEC. Wiring shall be concealed in finished spaces.

H. All wiring in finished spaces shall be run concealed, except where surface metal raceway systems are specifically noted on the plans or otherwise approved. Provide chases, soffets and boxouts, finished to match surrounding areas, as required.

I. Splices shall be made only at device outlet boxes. Addition or re-use of boxes in finished areas solely for the purpose of splicing will not be accepted.

J. All device outlet boxes shall be set flush to the final finish surface. All openings in the surface finish around the box shall be filled in accordance with the MEC. Where device outlet boxes are located in an area with existing device outlet boxes, match mounting heights, but not less than 18” above finish floor. Mount all boxes true and plumb. Patch and paint as needed.

K. Provide all traveler wiring required for three and four way switching shown.

L. All wiring shall be new. Remove all existing wiring and raceways to the maximum extent possible. Cut back and abandon concealed wiring and raceways.

M. All conductors shall be neatly arranged and bundled, without excess cable at any point, but with reasonable slack to allow installation and removal of the device.

N. Emergency circuit wiring shall be kept entirely independent of all other wiring.

3.10 GROUNDING

A. Bond and ground equipment and systems connected under this Section in accordance with standards of MEC and other applicable regulations. Provide approved means for terminating and connecting grounding conductors, such as lugs, crimp-on terminals, green ground screws, grounding wirenuts, etc.

B. Conduit system shall be electrically continuous throughout. Equipment frames, enclosures, boxes, etc. shall be grounded by use of green colored equipment ground conductor sized as per Table 250.122 of MEC. Raceway ground alone will not be accepted.

C. Green bonding jumper shall be installed in flexible conduits.

3.11 MOTORS AND CONNECTIONS

A. Motors will be provided under other Sections.

B. Check electrical connections and sizing of motor circuit protection and prevent damage to motors and equipment from incorrect direction of rotation.
C. Review existing conditions prior to disassembly/disconnection for verification of size, speed, and operation of existing motors.

D. Consult drawings and specifications and shop drawings for verifications of size, speed, and operation of motors furnished under other Sections.

E. Final connection to appliances and motors shall be made with flexible conduit (at least 16” long) with green ground wire installed.

F. Obtain necessary control wiring and interlocking diagrams from equipment suppliers for installation under this Section and connect equipment circuits for proper sequence of operation. Refer to sequence of operations provided under other Sections, and circuit equipment via control devices such as thermostats, relays, aquastats, contactors, etc.

3.12 WIRING DEVICES

A. Mount all wiring devices plumb in device outlet boxes. Center devices on boxes, and set true within the device plate. Set device plates so all edges contact surface, and conceal box edge.

B. Side wire devices only. Back wiring will not be accepted.

C. Provide neutral conductor to each switch location in accordance with MEC.

D. Provide GFCI protection for all 15A and 20A, 125V receptacles located in the following locations:
   1. Garages;
   2. Rooftops;
   3. Outdoors;

3.13 LIGHTING FIXTURES

A. Verify mounting construction, and provide fixtures, ballasts, frames, rings, mounting boards and other accessories suitable for construction encountered.

B. Coordinate installation of fixtures with installation of casework materials and mounting system. Coordinate wiring stub out location, so as to maintain wiring to light fixtures effectively concealed.

C. Investigate lighting fixture locations and supports to ensure that no interference exists between lighting fixture, supports and other equipment. Correct interference as directed by Engineer.

3.14 CIRCUIT BREAKERS

A. Install circuit breakers in panelboards. Mark panel schedule accordingly. Panel markings shall be printed by typewriter, printer or other suitable means. Handwriting will not be acceptable. Utilized circuits shall be marked in ink. Spare or spaces shall be so marked in pencil, and may be marked by hand. No circuit shall be described in a manner that depends on transient conditions of occupancy.

3.15 FIRE ALARM

A. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.

B. Permitting
1. It is recognized that various jurisdictions may have varying requirements for issuance of permits for work related to fire protection systems. The Contractor is responsible for determining the local authority(ies) having jurisdiction, what their requirements are, and providing all documents required for permitting. The Engineer will provide the contract document plans, specifications, and where requested by the AHJ, a fire protection construction documents narrative.

C. Comply completely with 780 CMR 33, Safeguards During Construction. Comply with NFPA 241 as listed in 780 CMR 35.

D. Wiring Methods

1. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. All junction boxes shall be spray painted red and labeled “Fire Alarm”, exposed conduit shall be EMT with minimum 2” wide red band maximum spacing every 5’, no less than one 2” per conduit between devices. Pre-painted raceways are not acceptable. System smoke detectors shall not be installed prior to the system programming and test period. During the construction period, measures shall be taken to protect existing and new smoke detectors from contamination and physical damage.

2. Cable must be separated from any open conductors of Power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, as per NEC Article 760.

3. Conduit shall be 3/4 inch (19.1mm) minimum.

4. Conduit shall not enter the Fire Alarm Control Panel, or any other remotely mounted Control Panel equipment or backboxes, except where specified by the factory.

5. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG for initiating device circuits and signaling line circuits, and 14 AWG for notification device circuits.

6. Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NFPA 70 (e.g., FPLR). Where located in ducts, provide suitably approved cable.

7. All field wiring shall be completely supervised.

E. Acceptance Testing

1. The Contractor shall provide notice as required by applicable codes to the Owner, occupants, engineer, general contractor, authorities having jurisdiction of scheduled testing. The Contractor shall make all necessary temporary provisions for reporting of fire while the system is being tested.

END OF SECTION
NB POLICE STATION HEADQUARTERS – SALLY PORT ADDITION
NEW BEDFORD, MASSACHUSETTS
Mount Vernon Group Architects, Inc., Project No. 02014.43

December 5, 2018

SECTION 31 10 00
SITE CLEARING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS
A. All the Contract Documents, including Drawings, General and Supplementary Conditions and Division 1 - General Requirements, apply to the Work of this Section.

1.02 SPECIAL INSTRUCTIONS
A. The Contractor shall become familiar with other Sections of the Specifications to determine the type and extent of work there under which affects the work of this section whether or not such work is specifically mentioned.
B. The Order of Conditions, issued by the Hanover Conservation Commission for this project, is attached to this Section. The Conditions of this Order shall be met by the Contractor.

1.03 DESCRIPTION OF WORK
A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:
   1. All materials, equipment, labor and services required for all Site Preparation Work, including all items incidental thereto, as specified herein and as shown on the Drawings.
   2. Spoiled materials not suitable for fill shall be removed from the site and disposed of legally. No burning on the site shall be permitted.
   3. Demolition and removal from site or removal and stockpiling for reuse of items shown on the Drawings to be removed and reused including but not limited to, paving, curbs, fencing, signage etc., as required.
   4. Removal and relocation of existing site improvements as shown on the Drawings, as required.
   5. Removal and disposal of pavement, above grade concrete/stone foundations, below grade footings, foundation walls, and other structures. Break up and completely remove from the site all other existing pavements, site improvements and structures so designated and remove other such existing items above and below not designated on the Drawings but required for removal in order to perform all Work.
   6. Removal and disposal of all utility lines and utility structures that directly interfere with the new Work under this contract. Protect all lines that are to remain in place for future use as indicated on the Drawings. Reroute any utilities scheduled to remain in place for future use that interfere with new Work either temporarily or permanently.

1.04 RELATED WORK SPECIFIED ELSEWHERE
A. Carefully examine all the Contract Documents for requirements that affect the Work of this Section.
B. Other Specification Sections which directly relate to the Work of this section include, but are not limited to, the following Sections:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
   2. Section 02 41 13 – Selective Demolition
   3. DIVISION 03 – CONCRETE; including all Sections contained therein
   4. Section 04 21 11 – Reinforced Unit Masonry
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
   7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
   8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
   9. DIVISION 09 – FINISHES; including all Sections contained therein.
   10. Section 10 60 13 – Wire Mesh Partitions
   11. Section 21 00 00 – Fire Protection
12. Section 22 00 00 – Plumbing
13. Section 23 00 00 - HVAC
14. Section 26 00 00 – Electrical
15. DIVISION 31 – EARTHWORK; including all Sections contained therein.

1.05 REFERENCE SPECIFICATIONS

1.06 SUBMITTALS
A. Prior to commencement of any demolition or site preparation operations submit to the Architect, for review, a schedule for the phased demolition and the proposed methods to insure against possible damage to existing areas adjacent to where demolition operations will occur.
B. Include a full description and plan for securing the site, safety devices maintenance of traffic and measures to be taken and time table for implementation.

1.07 PROTECTION
A. All rules and regulations governing the respective utilities shall be observed in executing all work under this Section. All work shall be executed in such a manner as to prevent any damage to existing buildings, streets, curbs, paving, service utility lines, structures and adjoining property. Monuments and benchmarks shall be carefully maintained and, if disturbed or destroyed, replaced as directed.
B. The Contractor shall assume full responsibility for damages caused by his or his Subcontractor’s equipment and personnel to existing buildings and grounds as well as adjoining private property.
C. The work of this Section shall be performed in such a manner as to cause no interference with access by the Subcontractors or other Contractors to all portions of the site as is necessary for the normal conduct of their work.

1.08 CLEAN-UP
A. Any soil, demolition debris or similar material which has been brought onto paved areas by hauling operations or otherwise shall be removed promptly, keeping these areas clean all times.

1.09 PRE-INSTALLATION MEETING
A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 – MATERIALS – NOT USED

PART 3 – EXECUTION

3.01 PREPARATION
A. Notify all corporations, companies, individuals or local authorities owning, or having jurisdiction over, utilities running to, through or across areas disturbed by demolition operations.
B. Have all utility services not otherwise designated to be disconnected by the Contractor disconnected at service mains in accordance with requirements governing the utility involved unless otherwise shown on the plan or directed by the Architect.
3.02 DEMOLITION
A. General
1. All existing features above and below grade within the contract limit lines shall be demolished as noted to prepare the site for all other work as specified in these Specifications, as shown on the Drawings and as ordered by the Architect.
2. All site features shown or ordered to be removed shall be completely removed or removed to the limits as shown or specified. Demolition of all utilities shown or ordered to be abandoned cut and plug, plug, cut and cap shall mean the complete disconnect of the utility from the service main. All utilities disconnected shall be plugged or capped as required by the governing utility to four (4) feet below finish grade.
3. All excavations resulting from the specified work shall be promptly backfilled and compacted. Any excavation within street lines shall be backfilled, compacted and paved all in accordance with the rules and regulations of the governing agency.
4. The burning of material or debris on the premises will not be permitted.
5. Remove and dispose of all unsuitable material off site as approved by the Architect. The City of New Bedford shall have right of first refusal for all materials. Any stockpiled material deemed surplus by the Architect shall also be removed.

3.03 CLEARING AND GRUBBING
A. Clearing shall consist of the cutting and removal of all trees, logs, stumps, brush, roots and other objectionable material as shown on the plans or as directed by the Architect.
B. Protect all areas to remain undeveloped outside the Limit of Work Line. Should these areas be damaged, the Contractor shall restore them to the satisfaction of the Architect at no additional cost. This includes the repairing and replacement of all damaged conditions such as plant materials and similar items.
C. Grubbing shall include the removal and disposal off site of all stumps and roots.
D. Fill all holes from removal of stumps and roots with specified fill compacted to subgrade.

3.04 CLEANING
A. Demolished material
1. All demolished material declared unsuitable by the Architect shall become the property of the contractor and be legally disposed of, off the premises, until otherwise indicated or specified.
2. Keep all public ways clear of all spillage from trucks hauling material to and from the project site.
B. Premises
1. The premises shall be left in a safe, clean and relatively orderly condition upon completion of work under this Section.
C. Dust Control
1. Thoroughly wet down all work being demolished and all trucking ways as necessary to prevent spreading dust. Provide all water, hoses and connections required for dust control.

3.05 RUBBISH REMOVAL
A. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.
SECTION 31 20 00
EARTH MOVING

PART 1 - GENERAL

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

1.02 SPECIAL INSTRUCTIONS
A. The Contractor shall become familiar with other Sections of the Specifications to determine the type and extent of work there under which affects the Work of this Section whether or not such work is specifically mentioned.

1.03 DESCRIPTION OF WORK
A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:
   1. All materials, equipment, labor and services required for all Earth Moving work, including all items incidental thereto, as specified herein and as shown on the Drawings, including but not limited to, the following:
      a. Excavate, remove and legally dispose of existing unsuitable materials (fill, silty sand) below the topsoil or loam in the base bid and replace with compacted structural fill.
      b. Excavate, remove and legally dispose of off-site, ledge and boulders two cubic yards and larger in open-cut excavation and replace with compacted structural fill.
      c. Excavate, remove and legally dispose of off-site, ledge and boulders two cubic yards and larger in trench excavation and replace with compacted structural fill.
   2. Spoiled material not suitable for fill shall be removed from the site and disposed of. No burning on the site shall be permitted.
   3. All topsoil shall be stripped to its entire depth wherever possible, screened and stockpiled for reuse as directed by the Architect.
   4. Excavating, filling, trenching, backfilling, compaction and concrete encasement of utility conduits, of all description, required for the construction of foundations, walls, building structures, utility structures, utilities, pavements, lawn areas and site improvements inside and outside the building footprint. Provide all additional fill materials as required and specified herein. Refer to Sections on Heating, Plumbing, Fire Protection, Electrical and Structural for other excavation.
      a. The Work of this Section shall include performance of pre and post blasting surveys, preparation of a blast design plan and analysis, and provision of all services in accordance with requirements of 527 CMR 13.00 Explosives and the Contract Documents, for all existing building structures and utilities located within 500 feet of the Limit of Work Line (LOW) as indicated on the Drawings. The Contractor shall coordinate with the City of New Bedford Fire Department to provide fire watch services before, during, and after all blasting performed under the Contract, in accordance with requirements of 527 CMR 13.00 Explosives and the Contract Documents.
   5. Pumping and/or bailing necessary to maintain excavated spaces free from water from any source whatsoever.
   6. Provide graded materials, as specified, for fills, base courses and backfills as required.
   7. Protect all existing buildings, utilities, roads, pavements, lawns, planting and other improvements from damage due to construction.
   8. Install fencing and safety devices or controls as specified and as necessary.
   9. Dust control and clean up.
B. The Work of this Section shall include all excavation, trenching, backfilling, and compaction as required for installation of all under slab conduit and/or piping provided under the Work of the following Sections:
1. Section 21 00 01 – Fire Suppression
2. Section 22 00 01 – Plumbing
3. Section 23 00 01 – HVAC
4. Section 26 00 01 – Electrical

1.04 RELATED WORK SPECIFIED ELSEWHERE
A. Carefully examine all the Contract Documents for requirements that affect the Work of this Section.
B. Other Specification Sections which directly relate to the Work of this section include, but are not limited to, the following Sections:
1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
2. Section 02 41 13 – Selective Demolition
3. DIVISION 03 – CONCRETE; including all Sections contained therein
4. Section 04 21 11 – Reinforced Unit Masonry
5. DIVISION 05 – METALS; including all Sections contained therein.
6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
9. DIVISION 09 – FINISHES; including all Sections contained therein.
10. Section 21 00 00 – Fire Suppression
11. Section 22 00 00 – Plumbing
12. Section 23 00 00 - HVAC
13. Section 26 00 00 – Electrical
14. DIVISION 31 – EARTHWORK; including all Sections contained therein
15. Section 32 12 00 – Site Improvements

1.05 REFERENCE SPECIFICATIONS
C. S.S.H.B. - Standard Specifications for Highways and Bridges, the Commonwealth of Massachusetts, Department of Public Works, latest edition.

1.06 BENCH MARKS AND ENGINEERING
A. Lines and grade work in accordance with Drawings and Specifications shall be laid out by a registered Civil Engineer or Surveyor employed by the Contractor. The Contractor shall establish permanent bench marks, to which access can easily be had during the progress of the work. The Contractor shall maintain all established bounds and bench marks and replace, as directed, any which may be disturbed or destroyed. The selection of the registered Civil Engineer or Surveyor shall be subject to the Architect’s approval. The General Contractor shall pay all costs of the services of the Civil Engineer or Surveyor.
B. The Contractor shall verify dimensions and elevations on the ground and report any discrepancies immediately to the Architect. Any discrepancies not reported prior to construction shall not be the basis for claims for extra compensation.

1.07 DEFINITIONS
A. The words “finished grades” as used herein mean the required final grade elevations indicated on the Drawings. Where not otherwise indicated, areas outside of buildings shall be given uniform slopes between points, for which finished grades are shown, or between such points and existing grade except that vertical curves or roundings shall be provided at abrupt changes in slope.
B. The word "subgrade" as used herein, means the required surface of natural soil, borrow fill or compacted fill. This surface is immediately beneath the site improvements, fill materials as mentioned in the Drawings, or other proposed surface material.

C. Trench shall be defined as an excavation of any length where the width is less than twice the depth and where the shortest distance between payment lines does not exceed ten (10') feet. All other excavations shall be defined as open excavations.

D. The words "invert" or "invert elevation" as used herein shall be defined as the elevation at the inside bottom surface of the pipe or channel.

E. The words "bottom of the pipe" as used herein shall be defined as the base of the pipe at its outer surface.

1.08 GRADES AND ELEVATIONS

A. The Drawings indicate, in general, the alignment and finished grade elevations and sewer, drain, water and underground electric invert grades. The Architect, however, may make such adjustments in grades and alignment as are found necessary in order to avoid interference between utilities and to adapt the piping to other special conditions encountered.

1.09 PROTECTION

A. All rules and regulations governing the respective utilities shall be observed in executing all work under this Section. All work shall be executed in such a manner as to prevent any damage to existing buildings, streets, curbs, paving, service utility lines, structures and adjoining property. Monuments and bench marks shall be carefully maintained and, if disturbed or destroyed, replaced as directed.

B. The Contractor shall furnish all facilities and materials necessary to prevent the earth at the bottom of excavation from becoming frozen or unsuitable to receive footing or other load bearing units.

C. The Contractor, under this Section, shall provide at his own expense adequate pumping and drainage facilities to keep the excavation sufficiently dry as not to affect adversely the quality or time of placement of concrete or other materials to be installed in the excavated areas.

D. The Contractor shall assume full responsibility for damages caused by him or his Subcontractor's equipment and personnel to the existing buildings and grounds as well as adjoining private property.

E. The work of this Section shall be performed in such a manner as to cause no interference with access by the abutters, Subcontractors or other Contractors to all portions of the site as is necessary for the normal conduct of their work.

1.10 PRE-INSTALLATION MEETING

A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 - PRODUCTS

2.01 FILL MATERIAL

A. Crushed stone - Crushed stone to be placed under and around underground storm water chambers and leaching basins as shown on the Drawings and as specified shall be washed, graded free of organic materials one and one-half (1-1/2) inch to three quarters (3/4) inch size. Gradation shall conform to S.S.H.B., Section M2.01.3 as follows:

<table>
<thead>
<tr>
<th>Sieve Size and Number</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>Maximum</td>
</tr>
<tr>
<td>2-inches</td>
<td>100 %</td>
</tr>
<tr>
<td>1-1/2 inches</td>
<td>95 %</td>
</tr>
<tr>
<td>1 inch</td>
<td>35 %</td>
</tr>
</tbody>
</table>

Earth Moving
31 20 00 - 3
B. Structural fill for support of Building foundations, floor slabs and base course for concrete sidewalks shall be widely graded sand and gravel, free of clay, organic material, snow, ice, frozen soil or other deleterious materials, and conforming to the following graduation requirements. Soil finer than the No. 200 sieve shall be nonplastic.

<table>
<thead>
<tr>
<th>U.S. Bureau of Standards</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sieve Size and Number</td>
<td>Minimum</td>
</tr>
<tr>
<td>3- inches</td>
<td>100 %</td>
</tr>
<tr>
<td>1 ½ inch</td>
<td>80%</td>
</tr>
<tr>
<td>1/2 inch</td>
<td>50%</td>
</tr>
<tr>
<td>No.4</td>
<td>30%</td>
</tr>
<tr>
<td>No.10</td>
<td>20%</td>
</tr>
<tr>
<td>No.60</td>
<td>5%</td>
</tr>
<tr>
<td>No.200</td>
<td>0 %</td>
</tr>
</tbody>
</table>

* 5% under sidewalks

1. Material falling within the above Specifications, encountered during the excavation, shall be stored in segregated stockpiles for reuse as Compacted Structural Fill. All material shall be subject to approval by the Architect.

C. Processed gravel for base course for bituminous concrete pavement shall be a processed material with angular particles meeting the requirements conforming to S.S.H.B. Section M2.01.7.

<table>
<thead>
<tr>
<th>U.S. Bureau of Standards</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sieve Size and Number</td>
<td>Minimum</td>
</tr>
<tr>
<td>2-inches</td>
<td>100 %</td>
</tr>
<tr>
<td>1-1/2 inch</td>
<td>70 %</td>
</tr>
<tr>
<td>No.3/4</td>
<td>50%</td>
</tr>
<tr>
<td>No.4</td>
<td>30%</td>
</tr>
<tr>
<td>No.50</td>
<td>8%</td>
</tr>
<tr>
<td>No.200</td>
<td>3 %</td>
</tr>
</tbody>
</table>

D. Ordinary Fill - Well-graded, natural inorganic soil approved by the Architect and meeting the following requirements to be used for general filling to subgrades in lawn areas and to the bottom of the subbase beneath pavements, sidewalks and other than specified above, and conforming to the following graduation requirements. Soil finer than the No. 200 sieve shall be non-plastic.

<table>
<thead>
<tr>
<th>U.S. Bureau of Standards</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sieve Size and Number</td>
<td>Minimum</td>
</tr>
<tr>
<td>6-inches</td>
<td>100 %</td>
</tr>
<tr>
<td>1 inch</td>
<td>50%</td>
</tr>
<tr>
<td>No.4</td>
<td>20%</td>
</tr>
<tr>
<td>No. 20</td>
<td>10%</td>
</tr>
<tr>
<td>No.60</td>
<td>5%</td>
</tr>
<tr>
<td>No.200</td>
<td>0 %</td>
</tr>
</tbody>
</table>

1. It shall be free of organic or other weak or compressible materials, of frozen materials, trash or other deleterious materials and of stones larger than six (6) inches maximum dimension.
2. It shall be of such nature and character that it can be compacted to the specified densities in a reasonable length of time.
3. It shall be free of highly plastic clays, of all materials subject to decay, decomposition or dissolution and of cinders or other materials which will corrode piping or other metal.
4. It shall have a maximum dry density of not less than one hundred (100) pounds per cubic foot.
5. Material from excavation on the site may be used as ordinary fill if it meets the above requirements.
6. Excavated rock and boulders not to exceed two (2) cubic yards may be used only in fill areas under lawns, provided they are at a minimum of twenty-four (24) inches below subgrades, placed and compacted in layers with no voids and all interstices filled.

E. Structural Fill
   1. Ordinary Fill and Processed Gravel for base course shall be tested for gradation using wash sieves using the appropriate ASTM Standards. The gradation curves shall fit entirely within the envelopes defined by the limits. Structural Fill, Ordinary Fill, and Processed Gravel shall be compacted to a minimum relative compaction of 95 percent.

F. Dense Graded Crushed Stone
   1. Dense graded crushed stone shall consist of durable crushed rock or durable crushed gravel stone, free from ice and snow, sand, clay, loam, or other deleterious material, conforming to SSHB, Section M2.01.0 through M2.01.6 size as indicated on Drawings. The dense graded crushed stone shall be uniformly blended and conform to the following gradation requirements. Dense graded stone shall be used in the courtyard garden around the planting beds.

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing By Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1/2-Inch Stone</td>
</tr>
<tr>
<td>2 inches</td>
<td>100</td>
</tr>
<tr>
<td>1 1/4 inch</td>
<td>100</td>
</tr>
<tr>
<td>1 inch</td>
<td>100</td>
</tr>
<tr>
<td>3/4 inch</td>
<td>100</td>
</tr>
<tr>
<td>5/8 inch</td>
<td>100</td>
</tr>
<tr>
<td>1/2 inch</td>
<td>85-100</td>
</tr>
<tr>
<td>3/8 inch</td>
<td>15-45</td>
</tr>
<tr>
<td>No. 4</td>
<td>0-15</td>
</tr>
<tr>
<td>No. 8</td>
<td>0-5</td>
</tr>
</tbody>
</table>

G. Sand shall consist of clean inert, hard, durable grains of quartz or other hard durable rock, free from clay, organics, surface coatings or other deleterious material, conforming to SSHB Section M1.04.1. Sand shall conform to the following gradation:

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1/2-inch</td>
</tr>
<tr>
<td>1/2-inch</td>
<td>100</td>
</tr>
</tbody>
</table>

H. Pea gravel shall consist of durable crushed rock or durable crushed gravel stone free from ice and snow, sand, clay, loam, or other deleterious or organic material. The pea gravel shall be double washed and shall be ¼-inch to 3/8-inch in size or equivalent to #9 double washed crushed stone.

I. Filter Fabric/Geotextile - Contractor shall use geotextile filter fabric in drainage recharge systems, underdrain systems between crushed stone and granular soils, leaching areas, or where indicated on the plans. The geotextile shall be placed on approved soil subgrades.
   1. Geotextile Fabric for Subsurface Drainage Systems: Non-woven polypropylene fabric having a Puncture Resistance (ASTM D4833) of at least 65 pounds, a permittivity (ASTM D4491) of at least 130 gal/min/sf, and an Apparent Opening Size (ASTM D4751) of 0.15 to 0.22 millimeters, such as Mirafi 140N, Contech C-40NW, or approved equal.
   2. Geotextile Fabric for Riprap and Pavements: Non-woven polypropylene fabric having a Puncture Resistance (ASTM D4833) of at least 110 pounds and an Apparent Opening Size (ASTM D4751) of 0.15 to 0.22 millimeters or less, such as Mirafi 180N, Contech C-80NW, or approved equal.
2.02 TEMPORARY STEEL SHEETING

A. Steel materials shall be of such size and strength as required by the excavation support design prepared and submitted by the Contractor’s Professional Engineer. Steel sheet piling may be new or used material but shall not contain splices, cutouts, patches or other alterations which would impair its integrity or strength.

B. Steel sheeting shall be on approved standard section, weighing not less than 22 pounds per square foot of wall and conforming to ASTM A6 and A328.

C. Where soldier piles and logging are used, the steel piles shall conform to ASTM A6.

PART 3 - EXECUTION

3.01 STRIPPING LOAM

A. Stripping shall consist of the removal of all loam to the full depth encountered below the original ground surface, as herein specified or directed by the Architect. Every effort shall be made to strip and stockpile all available loam on the site.

B. All loam so removed shall be stockpiled on the site where directed by the Architect. Loam shall be free of subsoil, stiff clay or hardpan and foreign material such as cinders, ashes, asphalt and wood. The suitability of stripped materials for use as loam shall be determined by the Architect, and his decision shall be final.

C. Stockpiled loam shall be kept separate from other excavated materials and shall be screened, free of roots, stones larger than three-quarter (3/4) inch and other undesirable material that would interfere with planting.

D. Excess loam shall become the property of the contractor and shall be removed from the site at no additional cost to the owner.

3.02 TEMPORARY STEEL SHEETING

A. The contractor is responsible for the adequacy of the excavation support system and shall retain the services of a Professional Engineer registered in the Commonwealth of Massachusetts to design the required excavation support systems. The contractor’s Professional Engineer shall practice in a discipline applicable to excavation work, shall have experience in the design of excavation support system and shall design in conformance with OSHA requirements. The contractor’s Professional Engineer shall provide sufficient on-site inspection and supervision to assure that the excavation support system is installed and functions in accordance with his design. Criteria listed here in defining the responsibilities of the construction manager’s Professional Engineer are minimum requirements.

B. The contractor shall submit the attached Certificate of Design completed and signed by the contractor and the Professional Engineer, identifying the Contractor’s Professional Engineer who will be responsible for design of the excavation support system, and including, for record purposes only:
1. An overall time schedule for construction of the braced excavation system.
2. A description of the anticipated sequence of construction.
3. Submit three (3) copies to the Architect of:
   a. Complete details of braced excavation methods, equipment and sizes and lengths of materials proposed to be used.
   b. Details of vibration monitoring devices and reports.
   c. Details of the means and methods that will be used in monitoring the integrity of the support system during its entire period of use to insure the safety of the excavation.
   d. Complete computations of the design of the braced excavation system bearing the seal of the responsible Registered Professional Engineer duly registered licensed to practice within a discipline applicable to excavation work, in the state where the project is located.
   e. Any other pertinent data required for record purposes by the Engineer.
C. Receipt of the information by the Architect will not relieve the contractor of the sole responsibility for the adequacy of the braces excavation system, and for assuring that there will be no resulting damage to adjacent existing pavement, utilities or structures, and for providing safe conditions within the sheeted areas.

D. Further for the record, upon completion of the work of this section, the contractor shall submit three (3) copies of all records of survey, vibration monitoring and inspection of existing structures to the Architect.

E. Work shall not be started until all materials and equipment necessary for construction are either on the site of the work or satisfactorily available for immediate use as required.

F. The sheeting shall be sufficiently tight to minimize any resulting lowering of the groundwater level outside the excavation.

G. The sheeting shall be driven by approved means to the design elevation. No ends or edges of sheeting shall be left exposed in a manner, which could create a possible had to safety of the public or a hindrance to traffic of any kind.

H. The satisfactory construction and maintenance of the excavation support system, complete in place, shall be the responsibility of the contractor.

3.03 EXCAVATION

A. General

1. Excavate all materials to the elevations, dimensions and form as shown on the Drawings and as specified for the construction of building structures, utility structures, utilities, site improvements and other structures necessary for the completion of the building, utilities and site work. All unsuitable materials within the indicated and specified limits shall be excavated and removed. Any quantities involving an extra or other adjustment of the Contract Price shall be subject to measurement verification and approval by the Architect prior to the excavation and removal of such materials. Measurement of quantities for payment purposes shall be by means of survey of the subgrade as described in item 3.04.B.14. Unsuitable materials shall include the following:
   a. Pavements, utility structures, building foundations and other man-made structures.
   b. Peat, organic silt and other organic materials subject to decomposition, consolidation or decay.
   c. Miscellaneous fill including silty sand, cinders, ash, glass, wood and metal
   d. Ledge or boulders except as specified for fills herein.
   e. Material with a maximum unit dry weight per cubic foot less than 100 lbs., as determined by ASTM D1557.
   f. Material containing greater than 3% organic matter by weight, topsoil, organic silt, peat, construction debris, roots and stumps.
   g. Material which has a Liquid Limit greater than 55 when tested in accordance with ASTM D 4318.
   h. Materials that do not meet one of the gradation specifications in this section.
   i. Material classified as unsuitable by the Geotechnical Engineer.

2. The Contractor shall obtain from the proper authorities locations of all utilities within the scope of this work so that there will be no damage done to such utilities. Neither the Owner nor the Architect will be responsible for any such damage, and the Contractor shall restore any structure or utility so damaged without additional compensation. Written notifications to the appropriate utility agencies shall be made at least ten (10) days prior to the commencement of any work.

3. Excess Material - Suitable excavated material which is required for fill and backfill shall be separately stockpiled as directed by the Architect. All surplus fill other than that required to complete the intent of the Contract shall become the property of the Contractor and shall be disposed of off the property by the General Contractor. All excavated materials which, in the opinion of the Architect, are not suitable for fill or backfill shall be removed and disposed of off the property.

4. Cobble and boulders shall be removed from at least one foot below the finished subgrade.

5. Any unsanitary conditions encountered, such as broken sewer mains or uncovered garbage shall be corrected or removed entirely as directed by the Architect.
B. Excavation for Building Structures

1. Refer to Structural and Mechanical Drawings and notes thereon which may affect Work under this Section.

2. Excavation shall be performed to elevations and dimensions indicated or specified, plus sufficient space to permit erection of forms and shoring, drains, masonry and the inspection of foundations.

3. If suitable bearing for foundations is not encountered at the depth indicated on the Drawings, the Contractor shall immediately notify the Architect and shall not proceed further until instruction are given and necessary measurements made for the purpose of establishing additional volume of excavation. Placing of footings, foundation walls or compacted fill on unsuitable material will not be permitted.

4. Unsuitable material under walls, footings foundations is herewith defined as topsoil and fill Tests required to evaluate such conditions shall be made at the Owner's expense. Footings and slabs shall bear on Structural Fill or on crushed stone placed directly on top of the natural sand.

5. Bottoms of excavations shall be protected from frost. Foundations, footings or slabs shall not be placed on frozen ground. The Contractor shall shore and brace excavations, protect all slopes and earth banks and provide sheet piling necessary to prevent cave-ins. Shoring and piling shall be removed before backfilling is completed but not until permanent supports are in place. Excavation of earth and/or rock beyond indicated or authorized limits shall be refilled with structural fill compacted to ninety-five (95) percent of the maximum dry density at optimum moisture content as specified herein or concrete as required by the Architect at no additional cost to the Owner.

6. The Contractor shall control the grading around the building so that the ground shall be pitched in order to prevent water from running into the excavated areas of the building or prevent damage to other structures. The Contractor shall furnish all pumping required to keep excavated areas clear of water during construction. Water shall not be conducted onto adjacent property.

7. Excavate to subgrade for concrete slabs and foundation footings and piers, including utility trenches, and footings down to approved subgrade. Coordinate with Structural Drawings for exact locations. Compact subgrade to ninety-five (95) percent of maximum dry density as determined by the Modified Proctor Compaction Test.

8. Make final excavations by hand or using smooth-bladed equipment to avoid disturbance and the formation of ridges which would be left by a bucket with teeth.

9. Prevent water accumulation on bearing surfaces, to reduce the possibility of softening of the subgrade soils.

10. The exposed subgrade soils must be examined in the field by the Geotechnical Engineer.

11. The bearing surface should be cleared of all loose and disturbed soil before any footings are placed. Prior to placing forms or reinforcing steel, the cleared area beneath the footings should be compacted with at least four coverages of a vibratory plate compactor weighing at least 200 pounds imparting at least 5,000 pounds dynamic force.

12. Note - When, during the process of excavation unsuitable material is encountered, such materials shall be uncovered and freed of loose material, and the Architect shall be notified by the Contractor before proceeding further. The areas in question shall then be cross-sectioned as stipulated herein. The Contractor shall not proceed with excavation of material claimed as fill until the material has been classified by the Architect. Failure on the part of the Contractor to uncover such materials or notify the Architect or take cross-sections will forfeit the Contractor's right-of-claim to any credits. The quantity of unsuitable material to be removed shall be based on the pay line limits as established herein. The quantity of unsuitable material to be removed shall be approved by the Architect.

13. The Contractor shall employ and pay a qualified registered Civil Engineer or registered Land Surveyor acceptable to the Architect to take cross-sections of rock before removal of same and to provide computations of cross-sections within the pay line limits. Complete current records of actual quantities of rock excavated, methods of excavation used and extent of labor and equipment involved shall be maintained, jointly, by the Contractor and the Architect, shall be dated, signed by both and duplicate copies retained by the Architect for record. Such records shall include plot plans showing at suitable scale, all elevations, locations and measurements of rock excavation and locations and measurement or computed volumes of boulders encountered. All labor and equipment necessary to make these plot plans and take these measurements shall be furnished by the Contractor, and no payment will be considered for rock which has been removed without obtaining the above required data.
C. Excavation for Site Improvements
   1. Excavate to the lines and grades shown on the Drawings and as specified to obtain the subgrades for the following items of work:
      a. Concrete slabs on grade
      b. Bituminous concrete road and parking pavement
      c. Concrete paving
      d. Vertical and sloped Granite curb
      e. Monolithic asphalt curb
      f. Seeded areas
      g. Shrub bed areas
      h. Unspecified improvements - to bottom elevation of item plus ample working space on all sides

D. Excavation for Utilities and Utility Structures
   1. The Work of this Section shall include all excavation, trenching, backfilling, and compaction as required for installation of all under slab conduit and/or piping. The Contractor shall coordinate installation of all under slab utility conduit and piping
   2. Construct surface subgrades including filling prior to excavation for utilities and utility structures. Excavate to the lines and grades shown on the Drawings and as specified herein to obtain the subgrade for the following items of work:
      a. Utility structures - to grades shown on the Drawings. Remove by excavating all unsuitable materials; including peat and organic silt, from under drainage structures and backfill with specified fills compacted in place to subgrades.
      b. Excavation for structures and other accessories shall have twelve (12) inch minimum and twenty-four (24) inch maximum clearance on all sides.
      c. All utility lines - to twelve (12) inches below bottom of utility lines or structures.
      d. Trench for water pipe to provide a minimum of five (5) feet of cover above top of pipe.
      e. Unless otherwise shown, provide separate trenches for each utility. Lay all piping in open trenches except where tunneling is required. Excavation for structures and other accessories shall have twelve (12) inch minimum and twenty-four (24) inch maximum clearance on all sides.
      f. Grade the bottom of trenches evenly to have a constant pitch in the direction of flow and to insure a uniform compacted thickness of selected material as called for.
   3. Existing services and utilities encountered shall be immediately repaired, protected and maintained in use until relocation of same has been completed or be cut and capped where directed or be prepared for connections when so required. All existing water mains are to be protected to remain in place for future use.

E. Excavation and removal of unsuitable materials
   1. Unsuitable materials are to be excavated and removed within the limits of work and disposed of off-site after the stripping, stockpiling and screening of the loam or topsoil and excavation of the subgrades for the building and paved drive and parking, earthmoving which is included in the Base Bid.
      a. Architect shall be notified by the Contractor, before proceeding with removal of the unsuitable materials. The areas in question shall then be cross-sectioned as hereinafter specified.
      b. The Contractor shall employ and pay for a licensed Registered Civil Engineer or Land Surveyor to take cross-sections of forest mat, subsoils and FILL before removal and to make computations of volume encountered within the Payment Lines. Cross-sections shall be taken in the presence of the Geotechnical Engineer and the computations approved by the Architect. The Owner has the option to perform independent cross-sections and computations of rock quantities.

F. Proof-rolling and Compaction of Exposed Subgrade
   1. All footing, slab-on-grade, and paved area subgrades shall be proof-rolled.
   2. Subgrade of footings in the natural sand should proof-rolled with a minimum of four passes of a 2-ton vibratory roller compactor.
3. Pavement subgrade should be proof-rolled with a minimum of four passes of a vibratory roller compactor imparting a minimum dynamic effort of 20 kips.

4. After the existing fill is removed beneath slabs, compact the exposed subgrade in the natural sand to a firm and unyielding condition with at least four passes of a vibratory roller compactor imparting a minimum dynamic effort of 20 kips.

5. If soft materials are indicated by rutting, pumping or weaving, they should be excavated and replaced as directed by the Geotechnical Engineer.

6. The geotechnical engineer may at his discretion request proof-rolling using a loaded rubber tire truck.

3.04 ROCK EXCAVATION

A. Should highly fractured or weathered bedrock be encountered during excavation, the following shall apply:

1. When rock is encountered in trenching operations or under buildings, retaining walls, play fields or utilities, it shall be excavated or ripped with a hydraulic backhoe. When it is demonstrated to the satisfaction of the Architect and the Geotechnical Engineer that this material can no longer be removed with a hydraulic backhoe and requires drilling and blasting, this material shall be classified as Rock Excavation.

B. Intermittent drilling and ripping performed to increase production and not necessary to permit excavation of material encountered will not be classified as Rock Excavation.

C. Measurements:

1. When, during the process of excavation, rock is encountered, it shall be uncovered and exposed in such a manner that the unbroken ledge surface is clearly visible, and the Architect shall be notified by the Contractor, before proceeding further. The areas in question shall then be cross-sectioned as hereinafter specified.

2. The Contractor shall employ and pay for a licensed Registered Civil Engineer or Land Surveyor to take cross-sections of rock before removal and to make computations of volume of rock encountered within the Payment Lines. Cross-sections shall be taken in the presence of the Geotechnical Engineer and the computations approved by the Architect.

D. Blasting

1. Blasting: Obtain written permission and approval of method from local authorities before proceeding with rock excavation. Explosives shall be stored, handled, and employed in accordance with state and local regulations or, in the absence of such, in accordance with the provisions of the "Manual of Accident Prevention of Construction" of the Associated General Contractors of America, Inc.

2. Notify the Architect at least 48 hours before any intended blasting and do no blasting without his specific approval of each blasting operation.

3. Contractor shall present evidence that his insurance includes coverage for blasting operations before doing any blasting work. A pre and post survey shall be performed for all buildings and utilities within 250 feet of the nearest blasting operations, conforming to the Municipal ordinance governing blasting and the Municipal Fire Department regulations.

4. All rock blasting shall be well covered with heavy mats or timbers chained together and the Contractor shall take great care to do no damage to existing structures, utility lines and trees to remain.

5. Any damage caused by the work of this Contractor shall be repaired to the full satisfaction of the Architect at no additional cost to the Owner.
6. Any rock fragments or loose material from blasting operations shall be removed. All voids shall be filled with a leveling layer of Fine Processed Blasted Rock, Ordinary Fill or lean concrete as directed by the Geotechnical Engineer.

7. Additional blasting requirements:
   a. Comply fully with National and City of New Bedford Regulations.
   b. All documentation submitted with application for “Use and Handling” PERMIT. 527 CMR 13:04 (11) E-1 states “A Use and Handling” Permit may be suspended or revoked by the head of the Fire Department or the Marshal or their designees for any violation of 527 CMR 13:00, or MGL c. 148”
   c. Meet all requirements of 527 CMR 13:00
   d. All Pre-Blast Surveys completed per 527 CMR 13:00
   e. Hours of Blasting 09:00 hrs through 16:00 hrs Mon. through Fri.
   f. No Blasting Saturdays, Sundays or Holidays.
   g. All shots to be double matted unless approved in advance by the Fire Chief.
   h. Shot size limited to 500 lbs unless approved in advance by the Fire Chief.
   i. Blast warning signals to be sounded in accordance with 527 CMR 13:00
   j. 24 and 1 hour notification to the fire department of intent to blast
   k. In or near residential areas, written notification must be distributed to homes advising of intent to blast at least three (3) days prior to blasting operations. Such written notification to include time frame of blasting operations and description of warning signals. The area of distribution shall be determined by the Fire Chief during pre-blast conference.
   l. One or more seismographs required on all shots.
   m. All seismographs to be calibrated and certified according to manufactures specifications and 527 CMR 13:00
   n. The Contractor shall excavate the rock at a minimum 24 inches below subgrade of footings, slabs and paved areas, and athletic fields unless otherwise directed by the Architect or Geotechnical Engineer.

E. Excavate rock to 6 inches beneath the bottom of utility lines, such as water, sanitary sewer, storm drainage, etc. and to 12 inches on each side of utility pipes smaller than 18 inches in diameter. For utility pipes larger than 18 inches, excavate rock to 18 inches on each side of the pipe.

F. Rock surfaces for foundations shall be carefully examined. Loose or shaken rock shall be removed to solid bearing, and the rock surface leveled, or shelved to a slope not exceeding one inch per two feet, or as directed. Depressions in the rock surface shall be filled with compacted Fine Processed Blasted Rock or Ordinary Fill.

G. If rock excavation is carried beyond the depth and dimensions to subgrade in other areas, the Contractor shall, at his own expense, furnish and install suitable compacted fill to subgrade as directed by the Architect.

H. Granular fill should not be placed directly on rock surfaces containing voids between fractures. Suitably sized crushed stone or a geotextile should be placed on the fractured surface prior to placing the fill to limit migration of smaller particles into the voids.

I. Rock surfaces that heave due to blasting should be compacted with a vibratory roller that imparts a minimum of 40 kips to the rock surface, prior to placing fill.

J. To reduce the magnitude of rock heave, drilling for blast holes should extend no more than 2 feet beneath footing bearing elevations; and beneath floor slab, and roadways.

K. To reduce the amount of overblast Contractor may use pre-splitting or controlled blasting. Rock cuts more than 25 feet in height should be pre-split in stages.

L. Complaints:
   1. Report all blasting complaints to the Architect within 24 hours of receipt thereof. Include the name, address, date, time received, date and time of blast complained about, and a brief description of the alleged damages or other circumstances upon which the complaint is predicated. Assign each complaint a number, and number all complaints consecutively in order of receipt.
2. Submit a summary report to the Architect each week which indicates the date, time and name of person investigating the complaint, and the amount of damage, if any.

3. When settlement of a claim is made, furnish the Architect with a copy of the release of claim by the claimant.

4. Immediately notify the Architect, throughout the statutory period of liability, of any formal claim or demands made by attorneys on behalf of claimants, or of serving of any notice, summons, subpoena, or other legal documents incidental to litigation, and of any out-of-court settlement or court verdict resulting from litigation.

5. Immediately notify the Architect of any investigations, hearings, or orders received from any governmental agency, board or body claiming to have authority to regulate blasting operations.

M. Basis of Payment: The total amount of rock excavation will be based upon the volume of rock excavated within and/or above the lines referred to in the next paragraph as "Payment Lines". The payment lines are only to be used as a basis of payment, and are not to be used as limits of excavation. Limits of excavation area as shown on the Drawings and as specified herein.

N. Payment Lines for Rock Excavation:

1. Payment lines for rock excavation are 24 inches below the bottom of the subbase layer at paved areas, 24 inches beneath the bottom of the topsoil layer in play fields, 24 inches beneath the bottom of site walls, and 24 inches beneath the ground surface of lawns.

2. Payment lines for rock excavation under pipes within the building and for utility trenches outside the building lines shall in no case be calculated as greater in width than the outside diameter of the pipe plus three feet for pipes up to 18 inches. For pipes 18 inches and larger payment lines shall in no case be calculated as greater in width than the outside diameter of the pipe plus two feet. Payment lines at bottom of all pipe and utility trenches shall be six inches below the bottom of the bedding material.

3. Payment lines for columns and footings within the building shall be a vertical line one foot from the toe of the footings; the depth shall be measured at 24 inches below the bottom elevations shown on the Drawings. Payment lines for rock excavation under slabs on grade shall be six inches below the bottom elevation of the specified gravel base course outside of the building and 24 inches below subgrade for slabs within the building.

4. Payment lines for manholes and catch basins shall be one foot outside of the outer wall and six inches below the bottom of the base material beneath the structure.

3.05 PROCESSING OF BLASTED ROCK ON SITE

A. Process blasted rock into Blasted Rock Fill by crushing it for use on site as Structural Fill, Processed Gravel or Ordinary Fill. The cost of processing the rock shall be included in cost of rock removal.

B. When processing the blasted the Contractor may mix the blasted rock with onsite soil, including subsoil that is free of organics to produce a well graded processed material.

C. Before blasted rock that is crushed and processed onsite is reused, it should be observed and approved by the geotechnical engineer. The soil to rock proportions placed into the crusher should be varied until the processed material meets the appropriate gradation requirements. The soil to rock proportion thus achieved should be maintained throughout the duration of the project.

D. The material placed into the crusher should be free of organics, wood, and other deleterious matter.

E. The jaws of the crusher should be adjusted periodically to maintain the crushing gradation.

F. Excess blasted rock, processed or unprocessed, not used on site shall be the property of the Contractor and shall be removed offsite at no additional cost to the Owner.

3.06 PROTECTION, SHORING AND DEWATERING

A. Protect open excavations with steel plates, fencing, warning lights and other suitable safeguards.

B. Shore and brace excavations as required so as to maintain them secure and provide sheet piling as necessary to prevent cave-ins. Remove shoring and piling before backfilling is completed and as specified herein.
C. Frost Protection - Make no excavations to the full depth indicated when freezing temperature may be expected unless the footing or slabs can be poured immediately after the excavation has been completed. Protect the bottoms as excavated from frost, if placing of concrete is delayed, with straw, tarpaulins or temporary heat until footings or slabs are poured and sufficient backfill is placed.

D. Provide all pumps and pumping facilities, including a well point system as necessary with attendants, to keep all excavations free from water from whatever source at all times, when work is in progress or when necessary for protection and integrity of the work in place. Trenches shall be kept water-free during jointing and for sufficient time thereafter to allow the jointing material to become fully set and completely resistant to water penetration.

E. Maintain ground water in the bearing soil strata at a safe level at all times by methods which prevent loss of fines or other disturbances to these strata. If the methods employed have not been adequate and the bearing value of the soil has been reduced, remove disturbed soil as directed and replace with compacted graded gravel or concrete at no expense to the Owner.

F. Any ditching required to keep the site free from water during construction is the responsibility of the Contractor and will be repaired, top-soiled and seeded before completion of work.

G. Groundwater. The Contractor shall design and submit a plan to collect and remove groundwater to the Architects prior to the start of excavations. Pump water removed from the excavation into settling tanks before being discharged. Obtain any required discharge permits from the City of New Bedford to discharge the water into the public drain system. Test ground water samples for possible contamination.

3.07 FILLS, BACKFILLS AND COMPACTION

A. Samples and Testing
1. All fill material and its placement shall be subject to quality control testing. A qualified laboratory will be selected by the Owner to perform tests on materials. All costs of testing will be paid for by the Owner. Test results and laboratory recommendations shall be available to the Architect.
2. Provide samples of each fill material from the proposed source of supply including on-site sources. Allow sufficient time for testing and evaluation of results before material is needed. Submit samples from alternate source if required.
3. Architect will be sole and final judge of suitability of all material.
4. The laboratory will determine maximum dry density and optimum water content in accordance with A.S.T.M. D-1557, Method D and the in-place density in accordance with A.S.T.M. D-1556.
5. Tests of material as delivered may be made from time to time. Materials in question may not be used, pending test results. Tests of compacted materials will be made regularly. Remove rejected materials and replace with new, whether in stockpiles or in place.
6. Cooperate with laboratory in obtaining field samples of in-place materials after compaction. Furnish incidental field labor in connection with these tests.

B. Placing Fills and Compacting
1. Fill material shall be placed in horizontal layers not exceeding the maximum loose lift thickness with the minimum number of passes of compaction equipment as summarized on the table below. Each layer shall be compacted to the percentage of maximum dry density specified for the particular type of fill and at a water content equal to optimum water content plus or minus two (2) percent. The maximum dry density and optimum water content shall be as specified herein.

<table>
<thead>
<tr>
<th>Compaction Method</th>
<th>Max. Loose Lift Thickness Less Below Structures &amp; Pavement</th>
<th>Less Critical Areas</th>
<th>Min. Number of Passes Less Below Structures &amp; Pavement</th>
<th>Critical Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand-operated vibratory plate or light roller in confined areas</td>
<td>8”</td>
<td>8”</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Hand-operated vibratory drum</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
drum rollers weighing at least least 1,000# in confined areas 8" 10" 6 4
Light vibratory drum Roller minimum weight at drum 5,000 min., Dynamic force 10,000# 10" 12" 6 4
Medium to heavy Vibratory drum roller, min. weight at drum 10,000# min. dynamic force 20,000# 12" 15" 6 4

1. Areas to be filled or backfilled shall be free of construction debris, refuse, compressible or decayable materials and standing water. Do not place fill when fill materials or layers below are frozen.

2. Notify the Architect when excavation is ready for inspection. Filling and backfilling shall not be started until conditions have been approved by the Architect.

3. Before backfilling against walls, the permanent structures must be completed and sufficiently aged to attain strength required to resist backfill pressures without damage. Temporary bracing will not be permitted except by written permission from the Architect. When filling on both sides of a wall or pier, place fill simultaneously on each side. Correct any damage to the structure caused by backfilling operations at no cost to the Owner. Place no stones closer than eighteen (18) inches to wall surfaces.

4. In confined areas adjacent to footings and foundation walls and in utility trenches beneath floor slab, the fill shall be compacted with hand operated vibration tampers. The maximum lift thickness shall be four (4) inches. The degree of compaction attained shall be equivalent to that attained in the adjacent open areas where heavy rolling equipment is used.

5. After the subgrade under concrete slabs and paved areas has been shaped to line, grade and cross-sections, it shall be rolled with an approved power roller weighing not less than six (6) tons until thoroughly compacted. This operation shall include any reshaping, refilling or wetting required to obtain proper compaction. Any areas that subsequently settle shall be refilled to true subgrade and properly compacted.

6. In freezing weather, a layer of fill shall not be left in an un-compacted state at the close of a day's operations. Prior to terminating operations for the day, the final layer of fill, after compaction, shall be rolled with a smooth-wheeled roller to eliminate ridges of soil left by tractors, trucks and compaction equipment.

C. Placing Structural Fills

1. In the building's structural fill shall be placed under the concrete footings and slabs and pavements in layers as described in the above table and compacted to at least ninety-five (95) percent of maximum dry density as determined by A.S.T.M. Test D1557.with moisture contents within + 2 percentage points of optimal moisture content. Incidental compaction due to traffic by construction equipment will not be credited toward the required minimum coverages.

2. Placement of structural fill should not be conducted when air temperatures are low enough to cause freezing of the moisture in the fill during or before placement, approximately 32 degrees F., or below. Fill materials should not be placed on snow, ice or un-compacted frozen soil. Structural fill should not be placed on frozen soil. No fill should be allowed to freeze prior to compaction. At the end of each day's operations, the last lift of fill, after compaction, should be rolled by a smooth-wheeled roller to eliminate ridges of un-compacted soil.

D. Placing Flowable Fill

1. Excavate around over and to 12 inches under and 4 feet on each side of existing sanitary sewer pipe and fill in the excavation with flowable fill as shown on the site plans.

E. Deficiency of Fill Materials

1. Provide required additional fill materials as specified if a sufficient quantity of suitable materials is not available from the required excavation on the project site at no additional cost to the Owner.

2. Where water content of the fill must be adjusted to meet this Specification, the fill shall be thoroughly disked to insure uniform distribution of any water added.
F. Fill and Backfill for Utilities
   1. Backfill trenches only after pipe has been inspected, tested and locations of pipes and appurtenances have been recorded.
   2. Each pipe section shall be laid on a twelve (12) inch minimum bed of crushed stone as specified herein above. In addition, the water line shall be set in a six (6) inch bed of sand. Bed shall be shaped by means of hand shovels to give full and continuous support to the lower one-third (1/3) of each pipe. Backfill by hand around pipe, and for a depth of twelve (12) inches above pipe, use sand or crushed stone and tamp firmly in layers not exceeding six (6) inches in thickness. Take care not to disturb the pipe. Compact the remainder of the backfill thoroughly with a rammer of suitable weight or with an approved mechanical tamper to achieve compaction of ninety-five (95) percent as specified.
   3. Trenches and utility structures shall be backfilled with greatest care; only the suitable materials taken from the excavation shall be used. Any additional fill materials required for backfilling to subgrades shall be graded fill or Ordinary Fill as specified. Backfill shall be compacted to ninety-five (95) percent as specified. No mud, frozen earth or stone more than six (6) inches in greatest diameter or other objectionable material shall be used for refilling. Any selected material required for filling, in addition to earth from trench excavation, shall be furnished and placed by the Contractor.

3.08 UTILITY SERVICES LINES
   A. Electrical, telephone, cable TV and gas services shall be as specified under other Sections. The excavating, trenching and backfilling for these utilities and other pertinent structures shall be done under this Section.
   B. Trenches for utility lines shall be excavated of Fill and other materials which the Architect deems not stable and backfilled to form a stable foundation for laying the utility lines.

3.09 SUBGRADE PREPARATION
   A. Bring all areas to required subgrade levels as specified and as determined from the Drawings.
   B. Maintain all subgrades for site improvements in satisfactory condition, protected against traffic and properly drained, until the surface improvement is placed. In areas to receive pavement or other surface materials, at top and bottom of embankments, along swales and elsewhere, place sufficient grade stakes to facilitate checking the subgrade levels. Correct all irregularities, compacting thoroughly any fill materials.
   C. Check all manhole covers, grates, valve boxes and similar structures for correct elevation and position and make, or have made any necessary adjustments in such structures.
   D. All subgrades must be inspected and approved by the Architect before paving, loaming or other site improvements are made.

3.11 WARNING TAPE OVER BURIED GAS, ELECTRIC, CABLE TV, TELEPHONE
   A. Provide and install plastic warning tape over all buried gas, electric and water lines as specified.
   B. Warning tape shall be installed according to Manufacturer's recommendations and a minimum of twelve (12) inches below finished grades.

3.12 DUST CONTROL
   A. The Contractor shall employ all possible methods and/or materials to prevent the spread of dust. Chemical materials may not be used on subgrades of areas to be seeded or planted.

3.13 RUBBISH REMOVAL
   A. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.
SECTION 32 12 10
SITE IMPROVEMENTS

PART 1 - GENERAL

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

1.02 DESCRIPTION OF WORK
A. The Work of this Section includes, but is not limited to, furnishing and installation of the following:
   1. All materials, equipment, labor and services required for all Site Improvement work, including all items incidental thereto, as specified herein and as shown on the Drawings.
   2. Construction chain link fence and gates

1.03 RELATED WORK SPECIFIED ELSEWHERE
A. Carefully examine all the Contract Documents for requirements which affect the Work of this Section.
B. Other Specification Sections which directly relate to the Work of this section include, but are not limited to, the following Sections:
   1. DIVISION 01 – GENERAL REQUIREMENTS; including all Sections contained therein
   2. Section 02 41 13 – Selective Demolition
   3. DIVISION 03 – CONCRETE; including all Sections contained therein
   4. Section 04 21 11 – Reinforced Unit Masonry
   5. DIVISION 05 – METALS; including all Sections contained therein.
   6. DIVISION 06 – WOOD AND PLASTICS; including all Sections contained therein
   7. DIVISION 07 – THERMAL AND MOISTURE PROTECTION; including all Sections contained therein.
   8. DIVISION 08 – DOORS AND WINDOWS; including all Sections contained therein.
   9. DIVISION 09 – FINISHES; including all Sections contained therein.
   10. Section 21 00 00 – Fire Suppression
   11. Section 22 00 00 – Plumbing
   12. Section 23 00 00 - HVAC
   13. Section 26 00 00 – Electrical
   14. DIVISION 31 – EARTHWORK; including all Sections contained therein
   15. Section 32 12 00 – Site Improvements

1.04 REFERENCE SPECIFICATIONS
A. Definitions and Reference Standards:
   2. AASHTO: American Association of State Highway and Transportation Officials.
   3. ACI: American Concrete Institute.
   5. SSHB: Standard Specifications for Highways and Bridges, the Commonwealth of Massachusetts, Mass. Highway Department, latest edition
   6. CPSC. U.S. Consumer Products Safety Commission
1.05 QUALITY ASSURANCE
A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.06 OTHER REQUIREMENTS
A. Upon completion of work under this Section, all excess materials and debris resulting from work under this Section which have not previously been cleaned up shall be cleaned up and removed from the project site.

1.07 PRE-INSTALLATION MEETING
A. The General Contractor shall schedule a pre-installation meeting to establish compliance and expectation of Work, maintain optimum working conditions, and coordinate the Work of this Section with related and adjacent Work. The meeting shall be attended by the General Contractor, Architect, and related Subcontractors.

PART 2 - PRODUCTS

2.01 CONSTRUCTION FENCE & GATES
A. Manufacturer of all chain link fence material for the fence and gates shall be subject to the Architect’s approval.
B. Fabric shall be steel wire, hot-dipped galvanized, two (2) inch mesh. The zinc coating shall weight two (2) ounces per square foot of surface. Fabric gauge: No. nine (9); height: seventy-two (72”) inches.
C. Posts and gate frames shall be A.S.A. Schedule Forty (40) galvanized steel conforming to A.S.T.M. 120. The pipe shall be galvanized to withstand twelve (12) one (1) minute immersions in the Preece Test and shall be the following size and weight:

<table>
<thead>
<tr>
<th></th>
<th>Outside Diameter (In inches)</th>
<th>Weight in Pounds (Per Linear Foot)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corner Braces</td>
<td>1.660</td>
<td>2.27</td>
</tr>
<tr>
<td>Line posts</td>
<td>1.9</td>
<td>2.72</td>
</tr>
<tr>
<td>Corner &amp; Terminal Posts</td>
<td>2.375</td>
<td>3.65</td>
</tr>
<tr>
<td>Gate posts</td>
<td>3.0</td>
<td>5.79</td>
</tr>
<tr>
<td>Internal gate bracing</td>
<td>1.660</td>
<td>2.27</td>
</tr>
</tbody>
</table>
D. Truss rods shall be three-eighths (3/8) inch diameter galvanized steel.
E. Fittings and other appurtenances shall be pressed steel, malleable or cast steel, galvanized to withstand six (6) one (1) minute immersions in the Preece Test.
F. Tension bars shall be three-sixteenths (3/16) inch by five-eighths (5/8) inch steel, galvanized to withstand six (6) one (1) minute immersions in the Preece Test.
G. Tie wires shall be No. Nine (9) gauge wires, galvanized to withstand six (6) one (1) minute immersions in the Preece Test.
H. Post caps shall be heavy malleable iron or pressed steel and galvanized to withstand six (6) one (1) minute immersions in the Preece Test.
   1. Gates shall have all latches, stops, keepers and hinges necessary for proper functioning.
I. Submit complete shop drawings of gates, hinges, drop bar locking devices, etc., for the Architect’s review prior to fabrication.
PART 3 - EXECUTION

3.01 CONSTRUCTION CHAIN LINK FENCE AND GATES

A. Set all posts to depth of three (3) feet, 10 feet on center. Set and plumb posts, fill holes for gate posts, corner and terminal posts with three thousand (3,000) psi concrete as specified. Crown top surface of concrete to shed water. Brace all terminal posts horizontally with sections used for top rail.

B. Brace all terminal posts horizontally with sections used for top and bottom rail. The top and bottom rails shall extend through all line posts to form a continuous brace from end to end of each stretch of fence fabric, be securely fastened at the end of each run, and have joints made with expansion sleeve couplings not less than six (6) inches long.

3.20 RUBBISH REMOVAL

A. The General Contractor shall remove all waste and debris and legally disposed daily in accordance with requirements of Section 01 50 00 – Temporary Facilities and Controls.

END OF SECTION