HILLMAN STREET COMPLEX BUILDING 9
FIRST FLOOR RENOVATION
Department of Facilities and Fleet Management
City of New Bedford
New Bedford, Massachusetts 02740
BID NUMBER 20192005

OWNER:
CITY of NEW BEDFORD
294 Liberty Street
New Bedford
MA 02740

Contact:
Robert Bichel
Project Supervisor
New Bedford Department of Facilities and Fleet Management

ARCHITECT:
Gorman Richardson Lewis Architects, Inc.
239 South Street
Hopkinton
MA 01748

Jonathan F. Mitchell
Mayor

Bid Documents Dated: 5 June, 2019 - GRLA Project No 2017034.04
ARCHITECT:
GORMAN RICHARDSON LEWIS ARCHITECTS
239 SOUTH STREET
HOPKINTON, MA 01748
T: (508) 544-2600
E: goneill@grlarchitects.com (Attn: George O’Neill)

MEP/FP ENGINEER:
GARCIA, GALUSKA & DESOUSA, INC.
370 FAUNCE CORNER ROAD
DARTMOUTH, MA 02747-1217
T: (508) 998-5700
E: ben_miller@g-g-d.com (Attn: Ben Miller)

ENVIRONMENTAL CONSULTANT
UNIVERSAL ENVIRONMENTAL CONSULTANTS
12 BREWSTER ROAD
FRAMINGHAM, MA 01702
T: (508) 628-5486
E: adieb@uec-env.com (Attn: Ammar M. Dieb)

END OF DOCUMENT
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PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF DOCUMENT
The City of New Bedford, the Awarding Authority, in conjunction with Department of Facilities and Fleet Management invites sealed bids for the **Hillman Street Complex- Building 9 First Floor Renovation**, in accordance with Drawings and Specifications prepared by Gorman, Richardson, and Lewis Architects of Hopkinton, MA. Bidding procedures shall be in accordance with all applicable portions of Massachusetts General Laws, Chapter 149 – Sections 44A to 44J, inclusive, Section 26 to 29 inclusive, and Chapter 30, Section 39F to 39M inclusive, and 39R of the General Laws of the Commonwealth of Massachusetts, as amended to date.

Project Value is estimated to be **$1,525,694.00**

General bidders must be certified by the Division of Capital Asset Management and Maintenance (DCAMM) in the category of **General Construction**.

The Work of this Contract is scheduled to be substantially completed no later than **February 5, 2020**.

Sealed General Bids for the General Contract will be received by the New Bedford Purchasing Department, 133 William Street, Room 208, New Bedford, Massachusetts, 02740 **until 2:00 pm, on Wednesday, July 10, 2019** at which time all bids will be publicly opened and read aloud. Included with General Bid shall be an Update Statement, DCAM Certification and 5% bid deposit.

Bid Documents will be available electronically and must be obtained by emailing Susan.Bruce@newbedford-ma.gov after June 5, 2019. A hard copy set of drawings and specifications shall be on file at the New Bedford Purchasing Department 133 William St # 208, New Bedford, MA 02740 for Contractor review.

General Bids must be submitted on the Form for General Bid included herein. The General Bids shall be completely filled in, signed, enclosed in an envelope, sealed and plainly marked with the project name. The General Bids shall be filed with the Owner at the New Bedford Purchasing Dept. location designated above accompanied by a bid deposit in the form of a bid bond or cash or a certified check on, or a treasurer's or cashier's check issued by, a responsible bank or trust company payable to the City of New Bedford in the amount of 5% of the bid.

Sealed Bids for the following sub-trades

- **Section: 09 30 13 CERAMIC TILING**  
- **Section: 09 51 00 ACOUSTICAL CEILINGS**  
- **Section: 09 90 00 PAINTING AND COATING**

will be received by the New Bedford Purchasing Department, 133 William Street, New Bedford, Massachusetts, 02740 02740 **until 2:00 pm, on Wednesday, June 26, 2019** at which time all bids will be publicly opened and read aloud. Included with Sub-bids shall be an Update Statement, DCAM Certification and 5% bid deposit.

Attention is directed to the minimum wage rates to be paid on the work as determined by the Commissioner of Labor and Industries under the provision of M.G.L. Chapter 149, Sections 26 and 27D inclusive. The Work of this Project shall require Minority/Women Owned Business participation pursuant to Chapter 193 of the Acts of 2004, and MGL Chapter 23A, Section 44 and MGL Chapter 7, Section 40N, as amended, and established as a policy by the City of New Bedford.

All bids shall remain in effect for thirty (30) days, Saturdays, Sundays and legal holidays excluded, after the opening of General Bids.
A **Non-mandatory** Site Inspection will be held on **Tuesday, June 18, 2019 at 9:30 a.m.** @ 181 Hillman Street, Building 9, New Bedford, MA.

The Owner reserves the right to waive any informalities and to reject any or all bids if it be in the public interest to do so.

Awarding Authority
City of New Bedford
Purchasing Department
Susan Bruce, Director of Purchasing
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

B. Related Work: The following items are not included in this Section and are specified under the designated Sections:

- 02 41 13 SELECTIVE DEMOLITION
- 02 82 13 ASBESTOS ABATMENT AND RELATED WORK
- 02 41 13.01 EXHIBIT A ASBESTOS TESTING REPORT

1.2 INFORMATION NOT GUARANTEED

A. Information on the Drawings and in the Project Manual relating to existing conditions of building and structures is from the best sources presently available.

B. Such information is furnished only for the information and convenience of the Contractor, and the accuracy or completeness of this information is not guaranteed.

1.3 EXISTING CONDITIONS

A. The project site, 181 Hillman Street, is a 3-acre parcel bordered by Hillman Street, Ash Street, Maxfield Street and Chancery Street in New Bedford, MA. The site contains eight (8) contiguous buildings and three (3) free-standing buildings. Buildings 6 and 11 are contiguous along Maxfield Street to the north and Building 9 is contiguous with its neighbor, Building 1, along Ash Street to the east.

B. Bldg. 9: (As shown on the 1950 construction drawings):
   a. The building has 2 stories above grade and a full basement below finish grade. The building is constructed with multi-wythe brick masonry exterior walls, poured concrete foundation and a steel-framed/ wood plank, low-slope roof pitched in one direction east (high) to west (low).
   b. Basement floor consists of 4-inch thick concrete slab on 6-inches crushed stone
   c. First Floor assembly consists of 16-inch deep steel beams supporting a 4 ½” thick reinforced concrete deck and wood plank walking surface.
   d. Second Floor assembly consists of 24-inch deep steel beams supporting 4-inch thick T&G wood plank decking
e. Roof assembly consists of 24-inch deep steel beams supporting 3-inch thick wood planking with rigid insulation and new (2015) Garland roofing system above. The roof deck slopes in one direct (7 inches in 47 feet) from the high side along Ash Street (east) to the low side along the Courtyard (west). Rain water is managed via exterior gutters along the west (courtyard) side of the building with new downspouts tied into a below-grade drain system.

f. **Basement Level:**
   i. Single loaded corridor along the west (courtyard) side providing access to the former Kitchen at the south end and abandoned classroom/vocation shop/storage rooms along the length of the basement level to the north.
   ii. Windows are limited to basement sash windows in kitchen area on Ash Street side and larger fixed windows in areaways along courtyard side.
   iii. Tunnel access to Building 3 from the single loaded corridor.

g. **First Floor Level:**
   i. Single loaded corridor along the west (courtyard) side providing access from the exterior and access to office spaces and restroom.
   ii. Access to elevator and adjacent First Floor of Bldg. 1 at north end

h. **Second Floor Level:**
   i. Single loaded corridor along the west (courtyard) side providing access to office spaces and restroom.
   ii. Access to elevator and adjacent Second Floor of Bldg. 1 at north end
   iii. Access to Bldg 3 (across courtyard) via elevated enclosed bridge

i. **Roof Level:**
   i. As noted by the roofing manufacturer (Garland), the current roof system, installed in early 2015, consists of the following:
      1. Wood plank roof deck
      2. 3 ½" polycyanurate insulation
      3. ⅝” wood fiberboard protection board ½” wood fiberboard
      4. 2 plies of type II Glasbase
      5. 1 ply of Stressply EUV modified membrane,
      6. flood coat of asphalt and 3/8” pea stone surfacing.

C. Coordinate and comply with requirements regarding use of the site, buildings, access, dumpster locations, utilities, and related facilities, as agreed to between the Owner and the Contractor.

B. Information on existing conditions, such as existing building dimensions, existing building construction and similar information, which is bound with the Contract
Documents or otherwise made available to the Contractor was obtained by the Owner for use by the Architect in the design of the Project.

1. Accuracy and Completeness: The Owner and Architect do not warrant or contend that this information is complete or accurate. The Contractor may use this information at his sole risk and judgment.

2. Concealed Conditions: No claim for extra cost or extension of time may be made because of the use of this information by the Contractor, except as provided in the Conditions of the Contract regarding Concealed Conditions. The Contractor may obtain additional information on existing conditions at his sole expense, if prior approval is obtained from the Owner.

C. Contractor’s Responsibilities:

1. The Contractor shall become thoroughly familiar with the existing conditions prior to construction including attachment, cutting, and drilling to avoid accidental damage to existing conditions including utilities and to avoid cutting structure not specifically indicated to be cut.

2. The Contractor shall become thoroughly familiar with the existing information and shall carefully examine the existing record information prior to construction including attachment, cutting, and drilling to avoid accidental damage to existing conditions including utilities and to avoid cutting structure not specifically indicated to be cut.

3. The Contractor shall examine existing building and structure to verify existing conditions including building and elevations, dimensions, and locations and conditions affecting proposed renovations and improvements.

D. Lead Paint, Asbestos and other Hazardous Materials Abatement:

1. It is anticipated that the existing building components as indicated in the Testing Report (EXHIBIT A) contain asbestos-containing materials and lead paint.

2. Handling of identified asbestos-containing materials shall be in compliance with all applicable rules and regulations is part of the work of this contract.

3. There may be other hazardous materials.

4. If other hazardous material is found on the site and recognized as such, all work will cease without penalty to the Contractor or Architect so that the Owner can take appropriate steps for its legal removal and disposal.

PART 2 - PRODUCTS
Not Used.

PART 3 - EXECUTION
Not Used.

END OF DOCUMENT
PART 1 GENERAL

A. PROJECT

The City of New Bedford, Massachusetts, and Department of Facilities and Fleet Management invites sealed bids for the following project:

**HILLMAN ST. COMPLEX BUILDING 9 FIRST FLOOR RENOVATION**

The work of this contract is predominantly renovations to the first floor level of Building 9, associated/required abatement and demolition, new restrooms and interior finishes, new mechanical, electrical, plumbing and fire suppression systems to support the new first floor renovation and extending into other areas of the building as required by code and the configuration of these systems, including new railings at the exterior entrance ramps and stairs.

The work is estimated to cost: $1,525,694.

**General Contract Bidders and Filed Sub-Bidders:**

Procedures respecting bids and the selection of contractors shall be in conformity with the General Laws of Massachusetts, Chapter 149, Sections 44A to 44H, inclusive, as amended and revised to date, which regulates the award of contracts for public buildings by competitive bidding. In the event of any discrepancy or inconsistency between the contract documents and the cited statute, the provisions of the statute shall govern.

B. GENERAL

1. **Examination of Site and Contract Documents**

All potential bidders are encouraged to attend the [non-mandatory site visit](#) scheduled Tuesday, June 18, 2019 at 9:30 a.m. @ 181 Hillman Street, Building 9, New Bedford, MA to ascertain personally, by investigation and observation, the locations of the various starting points of the new work, the extent and character of the work to be performed, and to familiarize themselves with existing conditions at the site. All Contractors and Subcontractors shall verify in the field all dimensions and measurements that are given in the specifications or indicated on the drawings and shall call to the attention of the City any errors, or discrepancies, that he/she may ascertain prior to bidding.
2. **Interpretation of Contract Documents**

All requests for interpretation of Contract Documents must be in writing. Oral interpretation by the Awarding Authority, its employees or others shall be not be binding or have any validity.

Any request for interpretation of the Contract Documents shall be submitted in writing, by mail or email, simultaneously, to:

Susan Bruce  
City of New Bedford  
Purchasing Department  
133 William Street, Room 208  
New Bedford, MA 02740  
Susan.Bruce@newbedford-ma.gov

George O’Neill  
Gorman Richardson Lewis Architects  
239 South Street  
Hopkinton, MA 01748  
goneill@grlarchitects.com

at least five (5) days before the date for opening of general bids. If necessary, an Addendum to the Contract Documents will be issued electronically via email to all bidders of record. It is the responsibility of each bidder to verify the number of Addenda issued and to secure any needed copies from the Purchasing Department before submitting a bid.

C. **PROCEDURE FOR GENERAL BIDS**

1. **Submission of Bids**

   a. The Bids shall be submitted on the Forms that are provided. The sealed envelope containing the Bid and the accompanying Bid Security (if required) shall be clearly marked on the outside as follows:

   “General Bid” for **Hillman St. Complex Building 9 First Floor Renovation**

   -----------------------------------------------
   (Name of Bidder)
   -----------------------------------------------
   (Address of Bidder)

   00 21 30 INSTRUCTIONS TO BIDDERS  
   Page 2 of 9
and the envelope shall be addressed to:

City of New Bedford  
Purchasing Department  
133 William Street Room 208  
New Bedford, Massachusetts 02740

b. **ALL BIDS SHALL BE SUBMITTED IN DUPLICATE.**
c. The General Base Bid shall be for the complete project as called for in the Specifications, no Alternates are to be included in the Base Bid.
d. The Bid Deposit specified in the Invitation for Bids shall be included in the envelope with the Bid Form.
e. Bids sent by mail are forwarded at the risk of the bidder and will not be accepted if received after the time for the opening of the bids.
f. The award of every such contract shall be made within thirty (30) days, Saturdays Sundays and legal holidays excluded, after such approval; No Bidder may withdraw his bid for at least thirty (30) days after the day and date set for the receipt of General Bids, Saturdays, Sundays, and legal holidays excluded.
g. If the Bidder is a Corporation a Vote of Corporate Authorization shall be submitted with the Bid.

2. **Rejection of General Bids**

Every General Bid which is not accompanied by a Bid Deposit or which otherwise does not conform to the requirements of Chapter 149, Sections 44A to 44J inclusive of the Massachusetts General Laws, or which is on a form not completely filled in, or which is incomplete, conditional or obscure, or which contains any additional information not called for, shall be invalid, and the Awarding Authority will reject every such bid.

Bid Forms must be completely and correctly filled in; giving all of the information that is requested. Bids must not be qualified in any manner. Such qualification may be cause for the rejection of the bid.

The Awarding Authority reserves the right to waive any informalities in the bidding procedure; to reject any or all bids, if it is deemed to be in the best interest of the City, and further, the Contract for the work may be awarded to any other than the low bidder if the low bidder does not possess the necessary skill, ability, or integrity for faithful performance or cannot certify ability to furnish labor that works in harmony with all other elements of labor.
3. **Return of Bid Deposits**

All Certified Checks, Certificates of Deposit or Bid Deposits of General Bidders, except those of the three (3) lowest responsible and eligible General Bidders, will be returned within five (5) days, Saturdays, Sundays, and legal holidays excluded, after the opening of the General Bids. Bid Bonds will be retained by the Awarding Authority unless accompanied by a self-addressed stamped envelope. The Bid Deposit of the three (3) lowest responsible and eligible General Bidders will be returned upon the execution and delivery of the general contract, or if no award is made, upon the expiration of the thirty (30) day time limit, Saturdays, Sundays and legal holidays excluded.

If any General Bidder fails to execute a Contract and to furnish a Performance and also a Labor and Materials Payment Bond, his Bid Deposit shall become the property of the Awarding Authority as Liquidated Damages; provided that the amount of the Bid Deposit shall not, in any event, exceed the difference between his price and the bid price of the next lowest responsible and eligible Bidder. The General Bid Deposit will be returned in case of death, disability, bona fide clerical or mechanical error of a substantial nature, or other unforeseen circumstances affecting the General Bidder.

4. **Bid Bonds**

Every General Bidder whose deposit is not returned pursuant to the provisions of the preceding section may file with the Awarding Authority at any time after five (5) days, Saturdays, Sundays, and legal holidays excluded, from the opening of the General Bids, a Bond in an amount not less than the amount of his Bid Deposit and in a form satisfactory to the Awarding Authority, with a surety company qualified to do business in the Commonwealth of Massachusetts. Upon the filing of a Bond, the Bid Deposit of the General Bidder filing such a Bond will be returned to him.

D. **EVALUATION OF BIDS AND AWARD OF CONTRACT**

1. **Selection of Contractor**

The Contract for this project will be awarded to the lowest, responsible and eligible Bidder. The words "lowest responsible and eligible Bidder" shall mean the Bidder whose bid is the lowest of those Bidders possessing the skill, ability and integrity necessary to the faithful performance of the work and who shall certify that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work. Essential information in regard to such qualifications shall be submitted; such as, Contractor's Qualification Statement submitted in such forms as the Awarding Authority may require.

If, after the selection of the lowest responsible and eligible General Bidder, it is decided to consider Sub-bidders other than the ones named by such General Bidders in his general bid, the awarding authority and such general bidder shall jointly consider all filed sub-bids.
not previously rejected. Any agreement to substitute a sub-bid for the one named in the selected General Bid shall result in an adjustment of the General Bid price by the difference between the amount of the Sub-Bid originally named and the amount of the Sub-Bid substituted therefore. If by such substitution the adjusted general bid price of the general bidder first selected becomes greater than the original general bid price of the second lowest responsible and eligible general bidder, then the latter shall be selected and his sub-bidders similarly considered.

If, by substitutions as hereinbefore provided, the total adjusted general bid price of the second selected general bidder becomes greater than the total adjusted general bid price of the first selected or greater than the original bid price of third lowest responsible and eligible general bidder, then the bidder having the lower of these two general bid prices shall be selected; provided, that if the third lowest responsible and eligible general bidder is selected, his sub-bidders shall be similarly considered. The general bidder finally selected, by the aforementioned process of substitutions shall be the General Bidder to whom the contract shall be awarded.

All Sub-Bidders when finally selected shall be notified in writing of their selection within forty-eight (48) hours thereafter by the General Bidder. The Form of Subcontract to be used shall be that stipulated in M.G.L. Chapter 149 Section 44F, a copy of which is included in these Specifications.

If a selected Sub-Bidder fails, within five (5) days, Saturdays, Sundays, and legal holidays excluded after presentation of a Sub-contract by the General Bidder selected as the General Contractor, to perform his agreement to execute a Subcontract with such General Bidder, in the form provided in the contract, contingent upon the execution of the general contract, and, if requested to do so by such General Bidder in the general bid to furnish a Performance and Payment Bond as stated in his Sub-bid, such General Bidder and the Awarding Authority shall select, from the other Sub-bids duly filed with the Awarding Authority for such Sub-trade, and not rejected under section forty-four H, the lowest responsible and eligible Sub-bidder at the amount named in his Sub-bid so filed against whose standing and ability the General Contractor makes no objection, and the contract price shall be adjusted by the difference, between the amount of such Sub-bid and the amount of the Sub-bid of the delinquent sub-bidder.

2. **Insurance and Indemnification**

This agreement becomes part of the contract for which the Contractor is performing services to **City of New Bedford**.

A. Contractor shall maintain workers compensation, general liability, automobile, professional liability and umbrella insurance for the minimum amount required by the contract that this contractor applies to or as outlined below, whichever limits and coverages are higher. Insurance coverages and certificates shall be provided and include **the City of New Bedford** as an additional insured, on a primary and non-contributory basis, on all liability policies.
B. Minimum required insurance limits (coverage on an occurrence basis):

**Commercial General Liability**
- $2,000,000 Products/Completed Operations Aggregate
- $2,000,000 General Aggregate
- $1,000,000 Any One Occurrence (coverage A)
- $1,000,000 Any One Person or Organization (Coverage B)

**Automobile Liability (Comprehensive Coverage)**
- $1,000,000 Each Accident

**Commercial Excess Liability (“Umbrella”)**
- $1,000,000 Products/Completed Operations Aggregate
- $1,000,000 General Aggregate
- $1,000,000 Any One Occurrence (coverage A)
- $1,000,000 Any One Person or Organization (Coverage B)

**Employers Liability (Coverage “B” on the Workers Compensation Policy)**
- $500,000 Each Accident
- $500,000 Each Employee for Injury by Disease
- $500,000 Aggregate for Injury by Disease

C. Any Contractor who does not carry worker’s compensation insurance coverage to protect himself personally from work-related injuries hereby fully releases, holds harmless, and indemnifies the City of New Bedford from any injuries that may occur to the Contractor himself during the course of this contract. In no way does this provision affect the absolute duty of every contractor to provide workers’ compensation insurance coverage to each and every one of his employees and himself according to the provisions of this Agreement and all applicable state and federal laws.

D. All Insurance Certificates must contain a clause indicating that certificate holders be given a minimum of 30 days written notice prior to the cancellation of contractors insurance. Contractor must furnish the certificate referred to above as an express condition precedent to the Contractor’s duty to make any progress payments to contractor pursuant to this Agreement.
E. To the fullest extent permitted by law, the contractor hereby acknowledges and agrees that it shall indemnify, hold harmless and defend the City of New Bedford, the Owner, and any of the officers, directors, employees, agents, affiliates, subsidiaries and partners from and against all claims, damages, losses and expenses, including but not limited to, attorney’s fees, arising out of or resulting from the performance of the Contractor’s Work under this contract, provided that any such claim, damage, loss or expense (1) is attributable to bodily injury, sickness, disease, or death or injury to or destruction of tangible property (other than to the Work itself) including loss of use resulting therefrom, and (2) is caused in whole or in part by any acts or omissions of the contractor, its employees, agents or anyone directly or indirectly employed by any of them or anyone whose acts any of them may be liable.

F. The contractor hereby acknowledges its obligation under the foregoing paragraph to indemnify the City of New Bedford against judgments suffered because of the contractor’s work and to assume the cost of defending the City of New Bedford against claims as described in the foregoing paragraph.

3. The Successful Bidder Shall Furnish the Following Bonds

A Contractor’s Performance Bond and a Labor and Materials Payment Bond for the full amount of the Contract Price. The cost of these Bonds is to be included in the Bid Price.

4. Corporate or Other Authorization

If the selected General Bidder is a corporation, the “Vote of Corporation Authorizing Execution of Contract” included in these Specifications shall be executed and submitted to the Awarding Authority by the selected General Bidder. Appropriate authorization for other types of legal entities will be determined by the Awarding Authority.

5. Award of Contract

The award of the Contract for this project will be made within thirty (30) days, Saturdays, Sundays, and legal holidays excluded, after the opening of the Bids. The award of every such contract in connection with which approval by an officer, board or agency of the
Federal or State government is required shall be made within thirty days, Saturdays, Sundays and legal holidays excluded, after such approval. (See M.G.L. Chapter 149, § 44A).

If the Bidder selected fails to perform his agreement to execute a contract in accordance with the terms of his Bid and furnish a Performance Bond also a Labor and Materials or Payment Bond as stated in the Bid, an award will be made to the next lowest responsible and eligible Bidder. The thirty-day time limit shall not be applicable to a second or subsequent award made after the expiration of the time limit with the consent of said next lowest responsible and eligible Bidder and his Sub-bidders, and made because the original award made within the time limit was invalid, or because the Bidder failed to execute the Contract or to provide a Performance Bond and a Labor and Materials or Payment Bond.

6. Liquidated Damages

The OWNER and CONTRACTOR realize that time is of the essence of this Agreement and that Owner will suffer financial loss if the Work (or individual phase of Work) is not completed within the time specified in the contract documents. They also recognize the delays, expenses and difficulties involved in proving the actual loss suffered by Owner if Work is not completed on time. Accordingly, instead of requiring any such proof, the Owner and Contractor agree that as liquidated damages for delay (but not as a penalty), CONTRACTOR shall pay Owner the amount of One Thousand Dollars ($1000.00) for each calendar day that expires after the time specified until the Work is Substantially Completed.

E. SPECIAL REQUIREMENTS

Bids shall be made on the basis of the Minimum Wage Schedule as determined by the Massachusetts Department of Labor (as published by the Division of Occupational Safety) and the U.S. Department of Labor. Attention is directed to the minimum wage rates to be paid on the work as determined by the Massachusetts Commissioner of Labor and Industries under the provisions of M.G.L. Chapter 149, Sections 26 and 27D, inclusive. The successful general contractor and all filed sub-bidders will be required to submit a certified payroll on a weekly basis for review by Contract Compliance Officer. Attention is further called to Labor Standards provisions regarding conditions of employment, including State Wage Rates, the Copeland Anti-Kickback Act, and the Contract Work Hours and Safety Standards Act. The schedule of such rates is to be made a part of this contract, and is hereinafter attached.

The General Contractor shall keep on this work, as long as required during its progress, a competent surveyor or engineer, and any necessary assistants, all satisfactory to the Owner. It shall be the primary duty of such contractor’s employees, to accurately establish, layout, and maintain all building lines, grid, lines, column lines, elevations, grades, etc. as required for construction of the project. At the completion of the work, the General Contractor shall remove all surplus material, debris, rubbish, etc., from the site, and shall leave the owner’s property in a neat, clean orderly condition.
General Contractor shall guarantee all labor and materials furnished and installed under this Contract, for a period of one (1) year from the date of final acceptance, and shall make all replacements or repairs to any defective materials or workmanship without any additional cost to the owner.

General Contractor shall also provide at its expense a standard manufacturer’s 30-year labor and materials warranty for the roof replacement at the City of New Bedford City Hall. The roof and roofing materials shall comply in all respects with the specifications set forth herein.

Any general contractor which is a foreign corporation as defined in Mass General Laws Chapter 156d Section 15.01 shall certify to the Awarding Authority, prior to the award of any contract, that he has complied with the provisions for foreign corporations under Sections 3 and 5 of Chapter 156d of the Massachusetts General Laws, and the dates of such compliance.

All work performed under this contract must comply with the current requirements of the Occupational Safety and Health Act of 1970 as administered by the U.S. Department of Labor, OSHA Administration, Washington, DC 20210. The Owner will provide the General Contractor for this project with an Exempt Purchase Certificate and Number issued pursuant to Chapter 14, Acts of 1966, Section 1, Subsection 6 (E) and (F) which will exempt the project cost from the Massachusetts Excise Tax.

Bidders are instructed not to include the sales tax in the Bid Price.

PART 2 - PRODUCTS
Not Used.

PART 3 - EXECUTION
Not Used.

END OF DOCUMENT
DATE:__________________________________

TO: CITY OF NEW BEDFORD
C/O NEW BEDFORD PURCHASING DEPARTMENT
133 WILLIAM STREET, Room 208
NEW BEDFORD, MASSACHUSETTS 02740
PURCHASING AGENT

A) The Undersigned proposes to furnish all labor and materials required for the Hillman Street Complex Building 9 First Floor Fit-out, 181 Hillman Street , New Bedford MA IN ACCORDANCE WITH THE ENCLOSED CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS.

B) This bid includes addenda numbered ________________

C) The total proposed contract price is ____________________________ Dollars. ($______________________________)

D) The subdivision of the proposed Contract Price is as follows:
   Item 1: The work of the General Contractor, being all work other than that covered by Item 2, $ ________________________________

E) Item 2: Filed Sub-Bids as follows:

<table>
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<tr>
<th>SUB-TRADE</th>
<th>NAME OF SUB-BIDDER</th>
<th>AMOUNT</th>
<th>BOND REQUIRED</th>
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Total of Item 2 : $ ________________________________
The undersigned agrees that, if he is selected as Contractor, he will, within five (5) days, Saturdays, Sundays, and legal holidays excluded, after presentation thereof by the awarding authority, execute a contract in accordance with the terms of this Bid, and furnish a Performance Bond, and also a Labor and Materials or Payment Bond, each of a surety company qualified to do business under the laws of the Commonwealth and satisfactory to the Awarding Authority, and each in the sum of the contract price, the premiums for which are to be paid by the Contractor and are included in the Contract Price.

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

The undersigned further certifies under the penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity.

The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of M.G.L. Section 29F of chapter 29, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulation promulgated thereunder.

The undersigned hereby certifies, under penalty of perjury, that the said undersigned has paid all State Taxes (Income Taxes, Unemployment Taxes, Excise Taxes, Real Estate Taxes, etc., etc.) due in compliance with the Tax Laws of the Commonwealth of Massachusetts M.G.L. Chapter 62C Sections 47A thru 49A.

The undersigned further certifies that the said undersigned shall comply with the City of New Bedford 'Bidders Affirmative Action Requirements, as contained in the BIDDING REQUIREMENTS of these project specifications.

D) Time of Completion

The number of calendar days shall not exceed 189 calendar days from the signing of the contract to Substantial Completion of this Contract.

Date: __________________

Name of General Bidder: _______________________________________________________

BY: ___________________________ ___________________________

(Authorized Signature) (Title)
Business Address: ________________________________________________

______________________________________________________________

City/State/Zip: ________________________________________________

Telephone #: ________________________________________________

Note: If the bidder is a corporation, indicate the State of Incorporation under the signature and affix the Corporate Seal; if a partnership, give full names and residential addresses in space above if different from the business address.

END OF DOCUMENT
CERTIFICATE AS TO CORPORATE BIDDER (GENERAL CONTRACTOR)

I certify that I am _______________________________ of the Corporation named ____________________________ as Bidder in the within Bid Form that _______________________________ who signed said Bid Form on behalf of the Bidder was then _______________________________ of said Corporation; that I know his signature and that his signature hereto is genuine and that said Bid Form was duly signed, sealed, and executed for and on behalf of said Corporation by authority of its Board of Directors.

(Corporate Seal)

__________________________________________________
(Signature)

__________________________________________________
(Title)

(This Certificate must be completed where the General Bidder is a Corporation, and should be so completed by its Clerk. In the event that the Clerk is the person signing the Proposal on behalf of the Corporation, this Certificate must be completed by another Officer of the Corporation.)

END OF DOCUMENT
PRIME/GENERAL CONTRACTOR UPDATE STATEMENT

Completely fill-out and sign Commonwealth of Massachusetts Division of Capital Asset Management and Maintenance (DCAMM) – Prime/General Contractor Update Statement and attach to Document 00 40 10, FORM FOR GENERAL BID.

Failure to do so shall result in rejection of Bid.

[A copy of DCAMM Prime/General Contractor Update Statement (Effective March 30, 2010), pages 1-10, follows this page.]

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

EFFECTIVE MARCH 30, 2010

Commonwealth of Massachusetts
Division of Capital Asset Management
PRIME/GENERAL CONTRACTOR
UPDATE STATEMENT
TO ALL BIDDERS AND AWARDING AUTHORITIES

A COMPLETED AND SIGNED PRIME/GENERAL CONTRACTOR UPDATE STATEMENT MUST BE SUBMITTED WITH EVERY PRIME/GENERAL BID FOR A CONTRACT PURSUANT TO M.G.L. c.149, §44A AND M.G.L. c. 149A. ANY PRIME/GENERAL BID SUBMITTED WITHOUT AN APPROPRIATE UPDATE STATEMENT IS INVALID AND MUST BE REJECTED.

Caution: This form is to be used for submitting Prime/General Contract bids. It is not to be used for submitting Filed Sub-Bids or Trade Sub-Bids.

AWARDING AUTHORITIES

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

BIDDER’S AFFIDAVIT

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

Bid Date ___________________________ Print Name of Prime/General Contractor ___________________________

Project Number (or name if no number) ___________________________ Business Address ___________________________

Awarding Authority ___________________________ Telephone Number ___________________________

SIGNATURE⇒ ___________________________

Bidder’s Authorized Representative
INSTRUCTIONS

INSTRUCTIONS TO BIDDERS

- This form must be completed and submitted by all Prime/General contractors bidding on projects pursuant to M.G.L. c. 149, §44A and M.G.L. c. 149A.
- You must give complete and accurate answers to all questions and provide all of the information requested. MAKING A MATERIALLY FALSE STATEMENT IN THIS UPDATE STATEMENT IS GROUNDS FOR REJECTING YOUR BID AND FOR DEBARRING YOU FROM ALL PUBLIC CONTRACTING.
- This Update Statement must include all requested information that was not previously reported on the Application used for your firm’s most recently issued (not extended or amended) Prime/General Contractor Certificate of Eligibility. The Update Statement must cover the entire period since the date of your Application, NOT since the date of your Certification.
- You must use this official form of Update Statement. Copies of this form may be obtained from the awarding authority and from the Asset Management Web Site: www.mass.gov/dcam .
- If additional space is needed, please copy the appropriate page of this Update Statement and attach it as an additional sheet.
- See the section entitled “Bidding Limits” in the Instructions to Awarding Authorities for important information concerning your bidding limits.

INSTRUCTIONS TO AWARDING AUTHORITIES

Determination of Bidder Qualifications

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

Bidding Limits

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

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

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

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

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

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

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

Correction of Errors and Omissions in Update Statements

Matters of Form: An awarding authority shall not reject a contractor’s bid because there are mistakes or omissions of form in the Update Statement submitted with the bid, provided the contractor promptly corrects those mistakes or omissions upon request of the awarding authority. [810 CMR 8.05(1)].

Correction of Other Defects: An awarding authority may, in its discretion, give a contractor notice of defects, other than mistakes or omissions of form, in the contractor’s Update Statement, and an opportunity to correct such defects, provided the correction of such defects is not prejudicial to fair competition. An awarding authority may reject a corrected Update Statement if it contains unfavorable information about the contractor that was omitted from the Update Statement filed with the contractor’s bid. [810 CMR 8.05(2)].
PART 1 - COMPLETED PROJECTS

LIST ALL PUBLIC AND PRIVATE *BUILDING* PROJECTS YOUR FIRM HAS COMPLETED SINCE THE DATE OF APPLICATION FOR YOUR MOST RECENTLY ISSUED (NOT EXTENDED OR AMENDED) DCAM CERTIFICATE OF ELIGIBILITY. YOU MUST REPORT ALL REQUESTED INFORMATION NOT PREVIOUSLY REPORTED ON THAT DCAM APPLICATION*.

<table>
<thead>
<tr>
<th>PROJECT TITLE &amp; LOCATION</th>
<th>WORK CATEGORY</th>
<th>CONTRACT PRICE</th>
<th>START DATE</th>
<th>DATE COMPLETED</th>
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Attach additional sheets if necessary

* If your firm has been terminated from a project prior to completion of the work or has failed or refused to complete its work under any contract, full details and an explanation must be provided. See Part 3 of this Update Statement.
PROVIDE THE FOLLOWING REFERENCE INFORMATION FOR EACH COMPLETED PROJECT LISTED ON THE PREVIOUS PAGE.

<table>
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<th>PROJECT TITLE</th>
<th>COMPANY NAME</th>
<th>CONTACT PERSON</th>
<th>TELEPHONE</th>
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<td>Owner</td>
<td>Contact Person</td>
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| OWNER:        | Owner        | Contact Person | Telephone |
| DESIGNER:     | Designer     | Contact Person | Telephone |
| GC:           | GC           | Contact Person | Telephone |

| OWNER:        | Owner        | Contact Person | Telephone |
| DESIGNER:     | Designer     | Contact Person | Telephone |
| GC:           | GC           | Contact Person | Telephone |

| OWNER:        | Owner        | Contact Person | Telephone |
| DESIGNER:     | Designer     | Contact Person | Telephone |
| GC:           | GC           | Contact Person | Telephone |

Is your company or any individual who owns, manages or controls your company affiliated with any owner, designer or general contractor named above, either through a business or family relationship?  

☐ YES  ☐ NO

Are any of the contact persons named above affiliated with your company or any individual who owns, manages or control your company, either through a business or family relationship?  

☐ YES  ☐ NO

If you have answered YES to either question, explain. ________
PART 2 - CURRENTLY HELD CONTRACTS

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

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROJECT TITLE &amp; LOCATION</td>
<td>WORK CATEGORY</td>
<td>START AND END DATES</td>
<td>ON SCHEDULE (yes / no)</td>
<td>CONTRACT PRICE</td>
<td>% NOT COMPLETE</td>
<td>$ VALUE OF WORK NOT COMPLETE (col. 5 X col. 6)</td>
<td>NO. OF YEARS REMAINING (see note below)</td>
<td>ANNUALIZED VALUE OF INCOMPLETE WORK (col. 7 ÷ col. 8) (divided by)</td>
</tr>
<tr>
<td></td>
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</tbody>
</table>

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

Column 8 • If less than one year is left in the project schedule, write 1.
• If more than 12 months are left in the project schedule, divide the number of months left in the project schedule by 12 (calculate to three decimal places).
PROVIDE THE FOLLOWING REFERENCE INFORMATION FOR EACH INCOMPLETE PROJECT LISTED ON THE PREVIOUS PAGE.

<table>
<thead>
<tr>
<th>PROJECT TITLE</th>
<th>COMPANY NAME</th>
<th>CONTACT PERSON</th>
<th>TELEPHONE</th>
</tr>
</thead>
<tbody>
<tr>
<td>OWNER: Owner</td>
<td>Owner</td>
<td>Contact Person</td>
<td>Telephone</td>
</tr>
<tr>
<td>DESIGNE: Designer</td>
<td>Designer</td>
<td>Contact Person</td>
<td>Telephone</td>
</tr>
<tr>
<td>GC: GC</td>
<td>Contact Person</td>
<td>Telephone</td>
<td></td>
</tr>
<tr>
<td>OWNER: Owner</td>
<td>Owner</td>
<td>Contact Person</td>
<td>Telephone</td>
</tr>
<tr>
<td>DESIGNE: Designer</td>
<td>Designer</td>
<td>Contact Person</td>
<td>Telephone</td>
</tr>
<tr>
<td>GC: GC</td>
<td>Contact Person</td>
<td>Telephone</td>
<td></td>
</tr>
<tr>
<td>OWNER: Owner</td>
<td>Owner</td>
<td>Contact Person</td>
<td>Telephone</td>
</tr>
<tr>
<td>DESIGNE: Designer</td>
<td>Designer</td>
<td>Contact Person</td>
<td>Telephone</td>
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<tr>
<td>GC: GC</td>
<td>Contact Person</td>
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</tr>
<tr>
<td>OWNER: Owner</td>
<td>Owner</td>
<td>Contact Person</td>
<td>Telephone</td>
</tr>
<tr>
<td>DESIGNE: Designer</td>
<td>Designer</td>
<td>Contact Person</td>
<td>Telephone</td>
</tr>
<tr>
<td>GC: GC</td>
<td>Contact Person</td>
<td>Telephone</td>
<td></td>
</tr>
</tbody>
</table>

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

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

If you have answered YES to either question, explain. ________
### PART 3 - PROJECT PERFORMANCE

For Parts 3 and 4, if you answer YES to any question, please provide on a separate page a complete explanation. Information you provide herein must supplement the Application for your most recently issued (not extended or amended) DCAM Certificate of Eligibility. You must report all requested information not previously reported on that DCAM Application for Prime/General Certificate of Eligibility. Include all details [project name(s) and location(s), names of all parties involved, relevant dates, etc.].

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Has your firm been terminated on any contract prior to completing a project or has any officer, partner or principal of your firm been an officer, partner or principal of another firm that was terminated or failed to complete a project?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>2. Has your firm failed or refused either to perform or complete any of its work under any contract prior to substantial completion?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>3. Has your firm failed or refused to complete any punch list work under any contract?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4. Has your firm filed for bankruptcy, or has any officer, principal or individual with a financial interest in your current firm been an officer, principal or individual with a financial interest in another firm that filed for bankruptcy?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>5. Has your surety taken over or been asked to complete any of your work under any contract?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>6. Has a payment or performance bond been invoked against your current firm, or has any officer, principal or individual with a financial interest in your current firm been an officer, principal or individual with a financial interest in another firm that had a payment or performance bond invoked?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>7. Has your surety made payment to a materials supplier or other party under your payment bond on any contract?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>8. Has any subcontractor filed a demand for direct payment with an awarding authority for a public project on any of your contracts?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>9. Have any of your subcontractors or suppliers filed litigation to enforce a mechanic’s lien against property in connection with work performed or materials supplied under any of your contracts?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>10. Have there been any deaths of an employee or others occurring in connection with any of your projects?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>11. Has any employee or other person suffered an injury in connection with any of your projects resulting in their inability to return to work for a period in excess of one year?</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
PART 4 - Legal or Administrative Proceedings; Compliance with Laws

Please answer the following questions. Information must supplement all judicial and administrative proceedings involving bidder’s firm, which were instituted or concluded (adversely or otherwise) since your firm’s Application for your most recently issued (not extended or amended) Certificate of Eligibility. You must report all requested information not previously reported on that DCAM Application for Prime/General Certificate of Eligibility.

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

The term “anyone with a financial interest in your firm” as used in this Section “I”, shall mean any person and/or entity with a 5% or greater ownership interest in the applicant’s firm.

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

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Have any civil, judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to the procurement or performance of any construction contract, including but not limited to actions to obtain payment brought by subcontractors, suppliers or others?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>2. Have any criminal proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to the procurement or performance of any construction contract including, but not limited to, any of the following offenses: fraud, graft, embezzlement, forgery, bribery, falsification or destruction of records, or receipt of stolen property?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>3. Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of any state’s or federal procurement laws arising out of the submission of bids or proposals?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4. Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of M.G.L. Chapter 268A, the State Ethics Law?</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
### PART 4 - Legal or Administrative Proceedings; Compliance with Laws (continued)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of any state or federal law regulating hours of labor, unemployment compensation, minimum wages, prevailing wages, overtime pay, equal pay, child labor or worker’s compensation?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of any state or federal law prohibiting discrimination in employment?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a claim of repeated or aggravated violation of any state or federal law regulating labor relations?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Have any proceedings by a municipal, state, or federal agency been brought, concluded, or settled relating to decertification, debarment, or suspension of your firm or any principal or officer or anyone with a financial interest in your firm from public contracting?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a claim of repeated or aggravated violation of any state or federal law regulating labor relations?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Has your firm been fined by OSHA or any other state or federal agency for violations of any laws or regulations related to occupational health or safety? Note: this information may be obtained from OSHA’s Web Site at <a href="http://www.osha.gov">www.osha.gov</a></td>
<td></td>
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<tr>
<td>11.</td>
<td>Has your firm been sanctioned for failure to achieve DBE/MBE/WBE goals, workforce goals, or failure to file certified payrolls on any public projects?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Other than previously reported in the above paragraphs of this Section I, have any administrative proceedings or investigations involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled by any local, state or federal agency relating to the procurement or performance of any construction contract?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Are there any other issues that you are aware which may affect your firm’s responsibility and integrity as a building contractor?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PART 5 - SUPERVISORY PERSONNEL

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

<table>
<thead>
<tr>
<th>NAME</th>
<th>TITLE OR FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

PART 6 - CHANGES IN BUSINESS ORGANIZATION OR FINANCIAL CONDITION

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

PART 7 – LIST OF COMPLETED CONSTRUCTION PROJECTS SUBMITTED TO THE DIVISION OF CAPITAL ASSET MANAGEMENT.

Attach here a copy of the list of completed construction projects which was submitted with your firm’s DCAM Application for your most recently issued (not extended or amended) DCAM Certificate of Eligibility. The Attachment must include a complete copy of the entire Section G – “Completed Projects” and the final page – “Certification” (Section J) containing the signature and date that the Completed Projects list (Section G) was submitted to the Division of Capital Asset Management.
KNOW ALL MEN BY THESE PRESENTS, that we the undersigned,

__________________________________________________________, as Principal,

(insert name of bidder)

and,

__________________________________________________________, as Surety,

(insert name of surety)

are hereby held and firmly bound unto the CITY of NEW BEDFORD, MASSACHUSETTS acting by
and through its DEPARTMENT FACILITIES and FLEET MANAGEMENT as Owner, in the sum of

__________________________________________________________ Dollars

($ __________________________ ) for the payment of which, well and truly to be made, we hereby
jointly and severally bind ourselves, our heirs, executors, administrators, successors, and
assigns.

The condition of this obligation is such that whereas the Principal has submitted to the Owner a
certain Bid attached hereto and hereby made a part hereof, to enter into a contract in writing,
hereinafter referred to as the "AGREEMENT" for:

HILLMAN STREET COMPLEX BUILDING 9 FIRST FLOOR FIT-OUT
New Bedford, Massachusetts 02740

NOW THEREFORE,

(a) If said BID shall be rejected, or in the alternative,

(b) If said BID shall be accepted and the Principal shall duly execute and deliver the form of
AGREEMENT attached hereto and shall furnish the specified bond for the payment for
labor and materials furnished for the performance of the AGREEMENT, then this
obligation shall be void, otherwise it shall remain in full force and effect; it being
expressly understood and agreed that the liability of the Surety for any and all claims
hereunder in no event shall exceed the amount of this obligation as herein stated.
The Surety, for value received, hereby agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by any extensions of the time within which the Owner may accept such BID; and said Surety does hereby waive notice of any such extensions.

IN WITNESS WHEREOF, the Principal and the Surety have set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and have caused this bond to be signed by their proper officers on this

________________________ day of ___________________, 2019.

CONTRACTOR AS PRINCIPAL                              SURETY

_______________________________            _____________________________________
(Signature)                                                                 (Signature)

_______________________________           _____________________________________
Name and Title:                                                                 Name and Title:

SEAL                                                                                       SEAL

END OF DOCUMENT
To all General Bidders Except those Excluded:

A. The undersigned proposes to furnish all labor and materials required for completing, in accordance with the hereinafter described plans, specifications and addenda, all the work specified in Section No. ______________ of the specifications and in any plans specified in such section, prepared by the Architect, GORMAN RICHARDSON LEWIS ARCHITECTS, INC. for HILLMAN STREET COMPLEX BUILDING 9 FIRST FLOOR FIT-OUT, 181 Hillman Street, New Bedford, Massachusetts 02740 for the contract sum of:

_____________________________________________________________ dollars

($ __________________ )

B. This sub-bid includes addenda numbered __________________________.

C. This sub-bid:

[ ] may be used by any general bidder except:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________


[ ] may only be used by the following general bidders:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

[To exclude general bidders, insert "X" in one box only and fill in blank following that box. Do not answer C if no general bidders are excluded.]

D. The undersigned agrees that, if he is selected as a sub-bidder, he will, within 5 days,
Saturdays, Sundays and legal holidays excluded, after presentation of a subcontract by the General Bidder selected as the General Contractor, execute with such General Bidder a subcontract in accordance with the terms of this sub-bid, and contingent upon the execution of the general contract, and, if requested so to do in the General Bid by the General Bidder, who shall pay the premiums therefor, or if prequalification is required pursuant to Section 44D 3/4, furnish a Performance Bond and a Payment Bond of a surety company qualified to do business under the laws of the Commonwealth and satisfactory to the Awarding Authority, in the full sum of the Subcontract Price.

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

Name | Class of Work | Bid Price
--- | --- | ---
_________ | __________ | ___________
_________ | __________ | ___________
_________ | __________ | ___________
_________ | __________ | ___________

[Do not give bid price for any class or part thereof furnished by undersigned.]

F. The undersigned agrees that the above list of bids to the undersigned represents bona fide bids based on the hereinbefore described Plans, Specifications and Addenda and that, if the undersigned is awarded the Contract, they will be used for the work indicated at the amounts stated, if satisfactory to the Awarding Authority.

G. The undersigned further agrees to be bound to the General Contractor by the terms of the hereinbefore described Plans, Specifications, including all General Conditions stated therein, and addenda, and to assume toward him all the obligations and responsibilities that he, by those documents, assumes toward the Owner.

H. The undersigned offers the following information as evidence of his qualifications to perform the work as bid upon according to all the requirements of the Plans and Specifications:

1. Have been in business under present business name _____________ years.
2. Ever failed to complete any work awarded? ________________
3. List one or more recent projects with names of the general contractor and architect on which you served as a sub-contractor for work of similar character as required for the above-named project.

<table>
<thead>
<tr>
<th>Building</th>
<th>Architect</th>
<th>Contractor</th>
<th>Amount of Contract</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>__________</td>
<td>__________</td>
<td>__________</td>
</tr>
<tr>
<td>(b)</td>
<td>__________</td>
<td>__________</td>
<td>__________</td>
</tr>
</tbody>
</table>
I. The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work; that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and that he will comply fully with all laws and regulations applicable to awards of subcontracts subject to Section 44F.

J. The undersigned further certifies that all workers to be employed on the project by the Subcontractor shall be trained personnel who are directly employed and supervised by the Subcontractor and who have been cleared by a City of New Bedford CORI investigation, or other security credentials as may be required by the Owner.

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

Date ___________________________

_____________________________________
(Name of Sub-bidder)

By ________________________________
(Title and Name of Person Signing Bid)

_________________________________
(Business Address)

___________________________________
(City and State)

END OF DOCUMENT
CERTIFICATE AS TO CORPORATE BIDDER (SUBCONTRACTOR)

I __________________________________________________________________ certify that I am _______________________________________________________________ of the Corporation named __________________________________________________________ as Bidder in the within Bid Form that __________________________________________________________ who signed said Bid Form on behalf of the Bidder was then __________________________________________ of said Corporation; that I know his signature and that his signature hereto is genuine and that said Bid Form was duly signed, sealed, and executed for and on behalf of said Corporation by authority of its Board of Directors.

(Corporate Seal)

__________________________________________________
(Signature)

__________________________________________________
(Title)

(This Certificate must be completed where the Sub-Bidder is a Corporation, and should be so completed by its Clerk. In the event that the Clerk is the person signing the Proposal on behalf of the Corporation, this Certificate must be completed by another Officer of the Corporation.)

END OF DOCUMENT
Completely fill-out and sign Commonwealth of Massachusetts Division of Capital Asset Management and Maintenance (DCAMM) – Sub-Bidder Update Statement and attach to Document 00 41 10, FORM FOR SUB-BID.

Failure to do so shall result in rejection of Bid.

[A copy of DCAMM Sub-Bidder Update Statement (Effective March 30, 2010), pages 1-10, follows this page.]

END OF DOCUMENT
Commonwealth of Massachusetts  
Division of Capital Asset Management

SUB-BIDDER UPDATE STATEMENT

TO ALL SUB-BIDDERS, TRADE CONTRACTORS AND AWARDING AUTHORITIES

A COMPLETED AND SIGNED SUB-BIDDER UPDATE STATEMENT MUST BE SUBMITTED WITH EVERY FILED SUB-BID PURSUANT TO M.G.L. c.149, §44F AND EVERY TRADE SUB-BID PURSUANT TO M.G.L. c. 149A. ANY FILED SUB-BID OR TRADE SUB-BID SUBMITTED WITHOUT AN APPROPRIATE SUB-BIDDER UPDATE STATEMENT IS INVALID AND MUST BE REJECTED.

Caution: This form is to be used for submitting Filed Sub-Bids and Trade Sub-Bids. It is not to be used for submitting Prime/General Contract bids.

AWARDING AUTHORITIES

If the Awarding Authority determines that the sub-bidder is not competent to perform the work as specified on the project, it should reject the bid.

SUB-BIDDER’S AFFIDAVIT

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

Bid Date
Print Name of Sub-bidder or Trade Contractor

Project Number (or name if no number)  
Business Address

Awarding Authority  
Telephone Number

SIGNATURE
Bidder’s Authorized Representative
INSTRUCTIONS

INSTRUCTIONS TO SUB-BIDDERS

- This form must be completed and submitted by all Filed Sub-Bidders bidding on projects pursuant to M.G.L. c. 149, §44F and Trade Contractors bidding on projects pursuant to M.G.L. c. 149A.
- You must give complete and accurate answers to all questions and provide all of the information requested. MAKING A MATERIALLY FALSE STATEMENT IN THIS SUB-BIDDER UPDATE STATEMENT IS GROUNDS FOR REJECTING YOUR BID AND FOR DEBARRING YOU FROM ALL PUBLIC CONTRACTING.
- This Sub-Bidder Update Statement must include all requested information that was not previously reported on the Application used for your firm’s most recently issued (not extended or amended) Sub-Bidder Certificate of Eligibility. The Sub-Bidder Update Statement must cover the entire period since the date of that Application, NOT since the date of your Certification.
- You must use this official form of Sub-bidder Update Statement. Copies of this form may be obtained from the awarding authority and from the DCAM Web Site: [www.mass.gov/dcam](http://www.mass.gov/dcam).
- If additional space is needed, please copy the appropriate page of this Sub-bidder Update Statement and attach it as an additional sheet.

INSTRUCTIONS TO AWARDING AUTHORITIES

Determination of Sub-Bidder Qualifications

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

Correction of Errors and Omissions in Sub-bidder Update Statements

Matters of Form: An awarding authority shall not reject a sub-bidder’s bid because there are mistakes or omissions of form in the Sub-bidder Update Statement submitted with the bid pursuant to M.G.L. c.149, §44D, provided the sub-bidder promptly corrects those mistakes or omissions upon request of the awarding authority. [810 CMR 8.13(1)].

Correction of Other Defects: An awarding authority may, in its discretion, give a sub-bidder notice of minor defects and omissions as to form in the Sub-bidder’s Update Statement and provide an opportunity to correct its Sub-bidder Update Statement. However, the sub-bidder shall not be allowed to make corrections to a Sub-bidder Update Statement if material information about the sub-bidder was omitted from the Sub-bidder Update Statement filed with the sub-bidder’s bid. The Awarding Authority shall advise DCAM of any material omissions in a Sub-bidder’s Update Statement. [810 CMR 8.13(2)].
PART 1 - COMPLETED PROJECTS

LIST ALL PUBLIC AND PRIVATE PROJECTS OF $20,000 OR MORE THAT YOUR FIRM HAS COMPLETED SINCE THE DATE OF APPLICATION FOR YOUR MOST RECENTLY ISSUED (NOT EXTENDED OR AMENDED) SUB-BIDDER CERTIFICATE OF ELIGIBILITY*.

<table>
<thead>
<tr>
<th>PROJECT TITLE &amp; LOCATION</th>
<th>WORK CATEGORY</th>
<th>CONTRACT PRICE</th>
<th>START DATE</th>
<th>DATE COMPLETED</th>
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Attach additional sheets if necessary

* If your firm has been terminated from a project prior to completion of the work or has failed or refused to complete its work under any contract, full details and an explanation must be provided. See Part 3 of this Sub-bidder Update Statement.
PROVIDE THE FOLLOWING REFERENCE INFORMATION FOR EACH COMPLETED PROJECT LISTED ON THE PREVIOUS PAGE.

<table>
<thead>
<tr>
<th>PROJECT TITLE</th>
<th>COMPANY NAME</th>
<th>CONTACT PERSON</th>
<th>TELEPHONE</th>
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<tbody>
<tr>
<td>OWNER: Owner</td>
<td>Owner</td>
<td>Contact Person</td>
<td>Telephone</td>
</tr>
<tr>
<td>DESIGNER: Designer</td>
<td>Designer</td>
<td>Contact Person</td>
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<tr>
<td>GC: GC</td>
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<tr>
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Is your company or any individual who owns, manages or controls your company affiliated with any owner, designer or general contractor named above, either through a business or family relationship? □ YES □ NO

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

If you have answered YES to either question, explain. ________
**PART 2 - CURRENTLY HELD CONTRACTS**

LIST ALL PUBLIC AND PRIVATE PROJECTS OF $20,000 OR MORE THAT YOUR FIRM HAS UNDER CONTRACT ON THIS DATE REGARDLESS OF WHEN OR WHETHER THE WORK COMMENCED.

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<tbody>
<tr>
<td>PROJECT TITLE &amp; LOCATION</td>
<td>WORK CATEGORY</td>
<td>START AND END DATES</td>
<td>ON SCHEDULE (yes / no)</td>
<td>CONTRACT PRICE</td>
<td>% NOT COMPLETE</td>
<td>$ VALUE OF WORK NOT COMPLETE (col. 5 X col. 6)</td>
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</table>
PROVIDE THE FOLLOWING REFERENCE INFORMATION FOR EACH INCOMPLETE PROJECT LISTED ON THE PREVIOUS PAGE.

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<td>Telephone</td>
</tr>
</tbody>
</table>

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

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

If you have answered YES to either question, explain. ________
PART 3 - PROJECT PERFORMANCE

For Parts 3 and 4, if you answer YES to any question, please provide on a separate page a complete explanation. Information you provide herein must supplement the Application for your most recently issued (not extended or amended) Sub-Bidder Certificate of Eligibility. You must report all requested information not previously reported on that Application. Include all details [project name(s) and location(s), names of all parties involved, relevant dates, etc.].

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>NO</th>
</tr>
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<tbody>
<tr>
<td>1. Has your firm been terminated on any contract prior to completing a project or has any officer, partner or principal of your firm been an officer, partner or principal of another firm that was terminated or failed to complete a project?</td>
<td></td>
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<tr>
<td>2. Has your firm failed or refused either to perform or complete any of its work under any contract prior to substantial completion?</td>
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<tr>
<td>3. Has your firm failed or refused to complete any punch list work under any contract?</td>
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<tr>
<td>4. Has your firm filed for bankruptcy, or has any officer, principal or individual with a financial interest in your current firm been an officer, principal or individual with a financial interest in another firm that filed for bankruptcy?</td>
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<tr>
<td>5. Has your surety taken over or been asked to complete any of your work under any contract?</td>
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<tr>
<td>6. Has a payment or performance bond been invoked against your current firm, or has any officer, principal or individual with a financial interest in your current firm been an officer, principal or individual with a financial interest in another firm that had a payment or performance bond invoked?</td>
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<tr>
<td>7. Has your surety made payment to a materials supplier or other party under your payment bond on any contract?</td>
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<tr>
<td>8. Has any subcontractor filed a demand for direct payment with an awarding authority for a public project on any of your contracts?</td>
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<tr>
<td>9. Have any of your subcontractors or suppliers filed litigation to enforce a mechanic’s lien against property in connection with work performed or materials supplied under any of your contracts?</td>
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<tr>
<td>10. Have there been any deaths of an employee or others occurring in connection with any of your projects?</td>
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<tr>
<td>11. Has any employee or other person suffered an injury in connection with any of your projects resulting in their inability to return to work for a period in excess of one year?</td>
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</tr>
</tbody>
</table>
PART 4 - Legal or Administrative Proceedings; Compliance with Laws

Please answer the following questions. Information must supplement all judicial and administrative proceedings involving bidder’s firm, which were instituted or concluded (adversely or otherwise) since your firm’s Application for your most recently issued (not extended or amended) Sub-Bidder Certificate of Eligibility. You must report all requested information not previously reported on that DCAM Application.

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

The term “anyone with a financial interest in your firm” as used in this Section “I”, shall mean any person and/or entity with a 5% or greater ownership interest in the applicant’s firm.

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

YES | NO

1. Have any civil, judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to the procurement or performance of any construction contract, including but not limited to actions to obtain payment brought by subcontractors, suppliers or others? ✖️ ✗

2. Have any criminal proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to the procurement or performance of any construction contract including, but not limited to, any of the following offenses: fraud, graft, embezzlement, forgery, bribery, falsification or destruction of records, or receipt of stolen property? ✖️ ✗

3. Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of any state’s or federal procurement laws arising out of the submission of bids or proposals? ✖️ ✗

4. Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of M.G.L. Chapter 268A, the State Ethics Law? ✖️ ✗
### PART 4 - Legal or Administrative Proceedings; Compliance with Laws (continued)

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<tbody>
<tr>
<td><strong>5.</strong> Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of any state or federal law regulating hours of labor, unemployment compensation, minimum wages, prevailing wages, overtime pay, equal pay, child labor or worker’s compensation?</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td><strong>6.</strong> Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of any state or federal law prohibiting discrimination in employment?</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td><strong>7.</strong> Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a claim of repeated or aggravated violation of any state or federal law regulating labor relations?</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td><strong>8.</strong> Have any proceedings by a municipal, state, or federal agency been brought, concluded, or settled relating to decertification, debarment, or suspension of your firm or any principal or officer or anyone with a financial interest in your firm from public contracting?</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td><strong>9.</strong> Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a claim of violation of state or federal law regulating the environment?</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td><strong>10.</strong> Has your firm been fined by OSHA or any other state or federal agency for violations of any laws or regulations related to occupational health or safety? Note: this information may be obtained from OSHA’s Web Site at <a href="http://www.osha.gov">www.osha.gov</a></td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td><strong>11.</strong> Has your firm been sanctioned for failure to achieve DBE/MBE/WBE goals, workforce goals, or failure to file certified payrolls on any public projects?</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td><strong>12.</strong> Other than previously reported in the above paragraphs of this Section I, have any administrative proceedings or investigations involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled by any local, state or federal agency relating to the procurement or performance of any construction contract?</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td><strong>13.</strong> Are there any other issues that you are aware which may affect your firm’s responsibility and integrity as a building contractor?</td>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>
PART 5 - SUPERVISORY PERSONNEL

List all supervisory personnel who will be assigned to the project if your firm is awarded the contract. Attach the resume of each person listed below.

<table>
<thead>
<tr>
<th>NAME</th>
<th>TITLE OR FUNCTION</th>
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PART 6 - CHANGES IN BUSINESS ORGANIZATION OR FINANCIAL CONDITION

Have there been any changes in your firm’s business organization, financial condition or bonding capacity since the date your current Certificate of Eligibility was issued? Yes ☐ No ☐

If YES, attach a separate page providing complete details.

PART 7 – LIST OF COMPLETED CONSTRUCTION PROJECTS SUBMITTED TO THE DIVISION OF CAPITAL ASSET MANAGEMENT ALONG WITH CERTIFICATION PAGE.

Attach here a copy of the list of completed construction projects which was submitted with your firm’s Application for your most recently issued (not extended or amended) Sub-Bidder Certificate of Eligibility. The Attachment must include a complete copy of the entire Section F – “Completed Projects” (Section G – “Completed Projects” for firms certified based upon their Prime/General Application), and the final page – “Certification Page”, (Section I in the Sub-bidder Application or Section J in Prime/General Application) containing the signature and date that the Completed Projects list (Section F or G) was submitted to the Division of Capital Asset Management.
I HEREBY CERTIFY THAT I HAVE RECEIVED THE FOLLOWING ADDENDUM

ADDENDUM #’S________________________________________________________

________________________________________
Person submitting bid

________________________________________
Company Name

Please include this form with your bid if applicable.
CERTIFICATE OF NON-COLLUSION

The undersigned certified under penalties of perjury that this bid has been made and submitted in good faith and without collusion or fraud with any other person. As used in this certification, the word “person” shall mean any natural person, business, partnership, corporation, union, committee, club or other organization, entity or group of individuals.

____________________________________
Signature of individual submitting bid

____________________________________
Name of business/organization
TAX COMPLIANCE CERTIFICATION

Pursuant to M.G.L. c. 62C, §49A, I certify under the penalties of perjury that, to the best of my knowledge and belief, I am in compliance with all laws of the Commonwealth relating to taxes reporting of employees and contractor, and withholding and remitting child support.

________________________________________
Signature of person submitting bid

________________________________________
Name of business
VOTE OF CORPORATION AUTHORIZING EXECUTION OF CONTRACT

I, the undersigned, a resident of _______________ in the State of _____________ hereby certify that I am the ___________ or duly authorized officer of ________________________________________________________________________, a _______________ Corporation duly organized by law and that this is a true, correct and complete copy of vote prepared at a meeting of the Directors of said corporation, duly called and held on ________________________________________________________________________, at which meeting a majority of the Directors were present and acting throughout, VOTED:

That ___________________________________________________ the _________________ of (Authorized Official*) (Title) the aforementioned corporation, be and hereby is authorized to affix the corporate Seal, sign and deliver in the name and on behalf of the corporation a contract with the City of New Bedford, Massachusetts for the HILLMAN STREET COMPLEX BUILDING 9 FIRST FLOOR FIT-OUT Project in the amount of $______________________________.

I further certify that the said vote as set out above has not been revoked or rescinded and is now in full force and effect, that said vote and action ordered thereby are in pursuance of the By-Laws of this Corporation.

IN WITNESS WHEREOF, I hereto set my hand this _____________day of ___________________, 2019.

Corporate Seal ____________________________________________

Clerk/Secretary

*This Must be the Person Authorized in your By-Laws to sign contracts.

NOTE: Since an Officer cannot certify to himself, this must be signed by someone other than the person signing the contract.
CONTRACTOR CERTIFICATION

As evidenced by the signature of the Contractor’s Authorized signatory below, the Contractor certifies under the pains and penalties of perjury that the Contractor shall not knowingly use undocumented workers in connection with the performance of any City contract; that pursuant to federal and state requirements, the Contractor shall verify the immigration status of all workers assigned to such contracts without engaging in unlawful discrimination; and that the Contractor shall not knowingly or recklessly alter, falsify, or accept altered or falsified documents from any such worker(s). The Contractor understands and agrees that breach of any of these terms during the period of each contract may be regarded as a material breach, subjecting the Contractor to sanctions, including but not limited to monetary penalties, withholding of payments, contract suspension or termination.

____________________________________________
Contractor Authorized Signature

____________________________________________
Printed Name

____________________
Date

Title_______________________ Telephone:________________

Fax:_____________________ Email:____________________
OSHA CERTIFICATION REQUIREMENT

Effective July 1, 2006, all employees of a contractor to be employed on public building and public works worksites must have successfully completed at least a 10 hour course in construction safety and health approved by OSHA at the time the employee begins work.

I, _______________________________________, as ___________________________________________, of the (Print Name) (Position with the entity submitting bid)

joint venture/corporation/partnership or other legal entity submitting this bid for a public works project falling under §39M of Chapter 30 of the Massachusetts General Laws and Chapter 149 of the same, do hereby certify that any and all employees found on my worksite for this project have, or will have by the start of their work on the project, successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that was at least 10 hours in duration.

A copy of the OSHA completion cards for each employee must be submitted to the City of New Bedford before work on this project is to begin and must be supplemented as new employees are hired or contracted to work on this project.

_______________________________________, as
Signature

_______________________________________, of
Position

_______________________________________, on
Company/Corporation/Joint Venture/Partnership/Etc.

________________________
Date
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of
DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be
included in and made a part of this Section.

1.2 AGREEMENT

A. CITY OF NEW BEDFORD STANDARD VERTICAL CONSTRUCTION CONTRACT For Projects
Over $100,000 Subject to M.G.L. c149, §44A -F shall be used as the Contract for the
Project.

B. At least three copies of this Contract shall be executed by both parties, each of whom
shall retain one copy for their files, plus one for the Architect.

C. A SAMPLE copy of this Agreement form), three (3) pages, immediately follows this
Document.

PART 2 - PRODUCTS
Not Used.

PART 3 - EXECUTION
Not Used.

END OF DOCUMENT
CITY OF NEW BEDFORD
STANDARD VERTICAL CONSTRUCTION CONTRACT
For Projects Over $100,000 Subject to M.G.L. c149, §44A -F

OWNER - CONTRACTOR AGREEMENT

This agreement ("Contract") is made as of the _____ day of ________________, 20___, by and between the City of New Bedford acting by and through its ________________(Department)___________ with a principal place of business at 133 William Street, New Bedford, MA 02740 and ______________________________ with a principal place of business at ______________________________, hereinafter called the “Contractor.”

Terms used in this Owner - Contractor Agreement which are defined in the General Conditions of the Contract shall have the meanings designated therein.

The Awarding Authority and the Contractor agree as follows:

Article 1. Scope of Work. The Work under this Contract is defined as all work required by the Contract Documents for the construction of ________________________________, City of New Bedford Contract No. ______________________________, in accordance with and as described in the Plans and Specifications dated ______________, 20______, prepared by ________________________________ ("Designer"), as modified by Addenda Nos. ______________, dated ________20___

Article 2. Time for Completion. The Contractor shall commence the Work under this Contract on the date specified in the written “Notice to Proceed,” and shall, within _______ days after such date, bring the Work to Substantial Completion and to the point at which a Certificate of Agency Use and Occupancy may be issued, and shall bring the Work to Final Acceptance within 45 days after the date specified for Substantial Completion.

Article 3. Contract Price. The Awarding Authority shall pay the Contractor, in current funds, for the performance of the Work, subject to additions and deductions by Approved Change Order(s), the Contract Price of ________________________________ Dollars ($________________________). The Unit Prices, if any, approved by the Awarding Authority are those included in the Contractor’s General Bid. The following Alternates have been accepted and their costs are included in the Contract Price:
Article 4. **Approved Subcontractors.** The filed Subcontractors listed in the Contractor’s General Bid submitted by the Contractor have been approved for the performance of the specified portions of the Work. No other filed Subcontractors and no non-filed Subcontractors shall be used for these or any other portions of the Work without the prior written approval of the Awarding Authority.

Article 5. **Certifications.** Pursuant to M.G.L. c. 62(c), s.49 (a), the individual signing this Contract on behalf of the Contractor hereby certifies, under the penalties of perjury, that to the best of his or her knowledge and belief the Contractor has complied with any and all applicable state and federal tax laws. The individual signing this Contract on behalf of the Contractor further certifies under penalties of perjury that the Contractor is not presently debarred from doing public construction work in the Commonwealth under the provisions of M.G.L. c. 29, s. 29F, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulation promulgated thereunder and is not presently debarred from doing public construction work by any agency of the United States.

Article 6. **The Contract Documents:** The following documents form the Contract, are incorporated by reference herein, and are referred to as the “Contract Documents:”
- The Instructions to Bidders
- The General Bid submitted by the Contractor
- This Owner — Contractor Agreement
- The General Conditions of the Contract
- The Supplementary General Conditions
- The Plans and Specifications, including Addenda identified in Article 1 above
- All Approved Change Orders issued after execution of this Owner - Contractor Agreement

Article 7. **Minority Business Enterprise and Women Business Enterprise Participation Goals and Minority/Women Workforce Utilization Percentages:** The applicable goals, if any, for minority business enterprise and woman business enterprise participation established for this Contract are as follows:


  The applicable minority workforce utilization percentage, if any, is __________.

  The applicable women workforce utilization percentage, if any, is __________.

Article 8. **Liquidated Damages.** For the purposes of Article VI of the General Conditions of the Contract, liquidated damages for delay shall be as follows:

  $1,000.00 (One thousand dollars and zero cents) Per day
In witness whereof, the parties hereto have caused this instrument to be executed in triplicate under seal as of the date set forth above.

<table>
<thead>
<tr>
<th>Contractor:</th>
<th>CITY OF NEW BEDFORD, MASSACHUSETTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>By:</td>
<td>By: Jonathan F. Mitchell</td>
</tr>
<tr>
<td>Title:</td>
<td>Title: Mayor</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CERTIFIED that funds are available</th>
<th>DEPT.</th>
</tr>
</thead>
<tbody>
<tr>
<td>By: Peter Schmidt</td>
<td>By:</td>
</tr>
<tr>
<td>Title: City Auditor</td>
<td>Title:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>APPROVED as to Form and Legality</th>
<th>PURCHASING DEPARTMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>By: Shannon Shreve</td>
<td>By: Susan Bruce</td>
</tr>
<tr>
<td>Title: Counsel II</td>
<td>Title: Chief Procurement Officer</td>
</tr>
</tbody>
</table>
KNOW ALL MEN BY THESE PRESENTS: That we

______________________________________________________ as Principal
(Name of Contractor)

______________________________________________________
(Corporation, Partnership, or Individual)

hereinafter called "Principal" and__________________________________________________
(Surety)

of ____________________________________________,
State of ____________________________________________,
hereinafter called the "Surety", are held and firmly bound into the called the "Surety", are held and firmly bound into the CITY of NEW BEDFORD acting by and through its DEPARTEMENT FACILITY and FLEET MANAGEMENT, hereinafter called the "Owner" for the sum of

______________________________________________________ Dollars ($_____________ ),
in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that Whereas, the Principal entered into a certain contract with the Owner dated

The _________________ day of ____________________________, 2014;
a copy of which is hereto attached and made a part hereof for the construction of:

HILLMAN STREET COMPLEX BUILDING 9 FIRST FLOOR RENOVATION
City of New Bedford
New Bedford, Massachusetts 02740
NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the Owner, with or without notice to the Surety, and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the Owner from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the Owner all outlay and expense which the Owner may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligation of this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work or to the specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, the parties to these present have duly executed in this bond on the

__________________________ day of ____________________________, 2019.

ATTEST:
(SEAL)

__________________________________________ (Principal)

By ___________________________________________ (Secretary)

(SEAL)

__________________________________________ (Address - Zip Code)

(Witness as to Principal)

__________________________________________ (Address - Zip Code)

NOTES:

1. Date of Bond must not be prior to date of Contract.

2. If Contractor is a Partnership, all partners must execute Bond.
KNOW ALL MEN BY THESE PRESENTS: That we

______________________________________________________as Principal
(Name of Contractor)

___________________________________________________________________________________
(Corporation, Partnership, or Individual)

hereinafter called "Principal" and ______________________________________________________
(Surety)

of ______________________
______________________________________________________,
State of ____________________________________________________________________________

hereinafter called the "Surety", are held and firmly bound into the called the "Surety", are held and firmly
bound into the CITY of NEW BEDFORD, MASSACHUSETTS acting by and through DEPARTMENT FACILITIES and
FLEET MANAGEMENT, hereinafter called the "Owner" for the sum of

______________________________________________________________Dollars ($_____________ ),

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind
ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that Whereas, the Principal entered into a certain contract with
the Owner dated

The__________________________ day of ____________________________, 2014;

a copy of which is hereto attached and made a part hereof for the construction of:

HILLMAN STREET COMPLEX BUILDING 9 FIRST FLOOR RENOVATION
City of New Bedford
New Bedford, Massachusetts 02740

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, subcontractors,
and corporations furnishing materials for or performing labor in the prosecution of the work provided for in
such contract, and any authorized extension or modification thereof, including all amounts due for materials,
lubricants, oil, gasoline, other fuels, repairs on machinery, equipment and tools, consumed or used in

00 61 20 LABOR AND MATERIALS PAYMENT BOND
Page 1 of 2
connection with the construction of such work, and all insurance premiums on said work, and for all labor,
performed in such work whether by subcontractor or otherwise, then this obligation shall be void; otherwise
to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change,
extension of time, alteration or addition to the terms of the contract or to the work to be performed
thereunder or the specifications accompanying the same shall in any wise affect its obligation on this bond,
and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms
of the contract or to the work or to the specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right
of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, the parties to these present have duly executed in this bond on the
__________________________________day of______________________________, 2019.

ATTEST:
(SEAL)
__________________________________  (Principal)

By________________________________________  (Secretary)

(SEAL)

__________________________________  (Address - Zip Code)

(Witness as to Principal)

__________________________________  (Address - Zip Code)

NOTES:

1. Date of Bond must not be prior to date of Contract.

2. If Contractor is a Partnership, all partners must execute Bond.

END OF DOCUMENT

00 61 20 LABOR AND MATERIALS PAYMENT BOND
Page 2 of 2
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.2 GENERAL CONDITIONS

A. The CITY OF NEW BEDFORD GENERAL CONDITIONS STANDARD VERTICAL CONSTRUCTION CONTRACT For Projects over $100,000 Subject to M.G.L. c. 149, s. 44A-F [hereinafter referred to as ‘General Conditions’ or ‘GENERAL CONDITIONS’] to the extent applicable and except as otherwise revised, amended or supplemented hereinafter, on the Drawings or in other parts of the Contract Documents, whether attached hereto or not, are hereby made a part of the specifications for this project and shall apply to all work under the Contract.

B. A DRAFT copy of this GENERAL CONDITIONS, immediately follows this Document.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF DOCUMENT
# CITY OF NEW BEDFORD

## GENERAL CONDITIONS

STANDARD VERTICAL CONSTRUCTION CONTRACT

For Projects over $100,000 Subject to M.G.L. c. 149, s. 44A-F

### GENERAL CONDITIONS OF THE CONTRACT

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ARTICLE I: DEFINITION OF TERMS

The following words shall have the following meanings as used in this Contract:
**Advertisement:** The Advertisement or Invitation for Bids or Proposals for the Work identified in Article 6 of the Owner - Contractor Agreement.

**Approval:** (or Approved): An approval in writing signed by the authorized signatory of the Awarding Authority.

**Architect:** The architect identified as the Designer in Article 1 of the Owner - Contractor Agreement.

**As directed (As permitted, as required, as determined or words of like effect):** The direction, permission, requirement or determination of the Designer or the Awarding Authority. Similarly, approved, acceptable, satisfactory or words of like import shall mean approved by or acceptable or satisfactory to the Designer, except as may be otherwise determined by the Awarding Authority.

**Awarding Authority:** The public agency awarding and administering this Contract identified as the Awarding Authority in the Owner - Contractor Agreement.

**Building Code:** All applicable rules and regulations to which the Awarding Authority is subject and which are contained or referenced in the code authorized by M.G.L. c. 143, s. 93 et seq., including all amendments thereto.

**Certificate of Occupancy:** A certificate signed by the Designer and the Awarding Authority pursuant to the requirements of Article VI of these General Conditions of the Contract, indicating that the Awarding Authority has determined that (1) the Work has been completed in accordance with the Contract Documents, except for Punch List items, (2) certificates of inspection, testing and/or approval (including a certificate of occupancy under the Building Code), operating permits for any mechanical apparatus which may be required to permit full use and occupancy of the Work by its intended users (which in a Subcontractor's case may include the Contractor) have been delivered to the Awarding Authority, (3) any applicable written warranties, operating instructions and related materials have been delivered to the Awarding Authority, and (4) the Work may be used for its intended purpose without substantial inconvenience or interference.

**Change Order:** (1) A written order not requiring the consent of the Contractor, signed by the Owner’s Project Manager and designated as a Change Order, directing the Contractor to make changes in the Work within the general scope of the Contract, or (2) any written or oral order from the Project Manager that causes any change in the Work, provided that the Contractor has given the Awarding Authority written notice stating the date, circumstances, and source of the order and that the Contractor regards the order as a Change Order.

**Contract:** The Contract formed by the Contract Documents as defined in Article 6 of the Owner - Contractor Agreement.

**Contract Documents:** The documents listed in Article 6 of the Owner - Contractor Agreement.

**Contract Modification:** Any alteration of the Contract Documents accomplished by a written agreement properly executed by the parties to this Contract.

**Contract Price:** The Contract Price stated in Article 3 of the Owner - Contractor Agreement which is the total sum owed to the Contractor for all of the Work.

**Designer:** The architect or engineer identified as the Designer in Article 1 of the Owner - Contractor Agreement, subject to the provisions of Article III, Section 1 of these General Conditions of the Contract.

**Engineer:** The Designer.

**Drawings:** The Drawings are the graphic and pictorial portions of the Contract Documents, wherever located and whenever issued, showing the design, location and dimensions of the Work, generally including Plans, elevations, sections, details, schedules, and diagrams.

**Final Acceptance:** The written determination by the Designer and by the Awarding Authority that the Work has been 100% completed, except for the Contractor's indemnification obligations, warranty obligations, obligations to continue to maintain insurance coverage for the time periods provided in the Contract Documents, and any other obligations which are intended to survive Final Acceptance and/or the termination of the Contract.

**General Bid:** The completed bid form submitted by the Contractor in accordance with the requirements of M.G.L. c. 149.

**Laws:** All applicable statutes, regulations, ordinances, codes, laws, orders, decrees, approvals, certificates and requirements of governmental and quasi-governmental authorities.

**Neutral:** An impartial third party not having an interest in the Owner, the Designer, the Contractor or the Project.
Notice to Proceed: The written notice provided by the Awarding Authority to the Contractor which authorizes the Contractor to commence the Work as of a date specified therein, from which date the time of completion specified in Article 2 of the Owner - Contractor Agreement is measured.

Or equal (or words of like import): Equal in the opinion of the Awarding Authority determined pursuant to the provisions of M.G.L. c.30, s. 39M and the provisions of these General Conditions of the Contract.

Owner: The city of New Bedford, Massachusetts.

Plan(s): Drawing(s).

Product Data: Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor or its Subcontractors and suppliers to illustrate materials or equipment for some portion of the Work. Product data also include any such information or instructions produced by the manufacturer or distributor of such materials or equipment and made readily available by said manufacturer or distributor.

Progress Schedule: The progress schedule Approved by the Designer and the Awarding Authority in accordance with Article VI of these General Conditions of the Contract.

Project: The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner or by separate contractors.

Owner's Project Manager (OPM): The Awarding Authority's representative assigned to the Project.

Punch List: A list of items determined by the Awarding Authority to be minor incomplete or unsatisfactory work items that do not materially impair the usefulness of the Work for its intended purpose.

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

Schedule of Values: The schedule Approved by the Awarding Authority pursuant to Article VIII of these General Conditions of the Contract which allocates the Contract Price to the various portions of the Work and is used as a basis for payments to the Contractor.

Shop Drawings: Drawings, diagrams, details, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate a portion of the Work.

Site: The land and, if any, building(s) or space within any such building(s) on which or in which the Contractor is to perform the Work.

Specifications: The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, construction systems, standards, and workmanship for the Work and performance of related services.

Subcontractor: Person or entity with whom the Contractor contracts in order to perform the Work, except as otherwise specifically provided or required herein or by Law.

Substantial Completion: For work subject to M.G.L. c. 30 s. 39K, "substantial completion" shall occur when (1) the Contractor fully completes the Work or substantially completes the Work so that the value of the Work remaining to be done is, in the estimate of the Awarding Authority, less than one percent of the original contract price, or (2) the Contractor substantially completes the work and the Awarding Authority takes possession for occupancy, whichever occurs first. For work subject to M.G.L. c. 30 s. 39G "substantial completion" shall mean either that the work required by the Contract has been fully completed, completed except for work having a Contract Price of less than one percent of the then adjusted total Contract Price, or substantially all of the Work has been completed and opened to public use except for minor incomplete or unsatisfactory work items that do not materially impair the usefulness of the Work.

Superintendent: The licensed construction supervisor who is an employee of the Contractor designated to be in full-time attendance at the Site throughout the prosecution and progress of the Work and who shall have complete authority to act for the Contractor.

Work: The Work defined in Article 1 of the Owner - Contractor Agreement, Article II, Section 2 of these General Conditions of the Contract and otherwise in the Contract Documents.

Working Hours: 7:00 a.m. to 5:00 p.m., but not more than eight hours per day, Monday through Friday, unless otherwise specified by applicable Laws.
All terms that this Contract defines may be used with or without initial capital letters. Other terms, abbreviations and references are defined as they appear herein. Words and abbreviations that are not defined in the Contract Documents but which have recognized technical or trade meanings are used in accordance with those meanings. For additional definitions of terms, abbreviations and references refer to the Supplementary General Conditions, or Specifications.

ARTICLE II: EXECUTION OF THE CONTRACT, SCOPE OF WORK, INTERPRETATION OF CONTRACT DOCUMENTS

1. Execution.
The execution of the Owner – Contractor Agreement by the Contractor is a representation that the Contractor has visited the Site, has become familiar with local conditions under which the Work is to be performed and has correlated personal observations with requirements of the Contract Documents.

2. Scope of Work.
The Work consists of the Work identified in the Contract Documents. The Work comprises the completed construction required by the Contract Documents and includes all labor, tools, materials, supplies, equipment, permits, approvals, paperwork, calculations, submittals, and certificates necessary to develop, construct and complete the Work in accordance with all Laws, and all construction and other services required to be supervised, overseen, performed or furnished by Contractor or that the Contract Documents require the Contractor to cause to be supervised, overseen, performed or furnished. The Contractor shall provide and perform for the Contract Price all of the duties and obligations set forth in the Contract Documents.

3. Interpretation.

   A. The Plans and Specifications and other Contract Documents are to be considered together and are intended to be mutually complementary, so that any work shown on the Plans though not specified in the Specifications, and any work specified in the Specifications though not shown on the Plans, is to be executed by the Contractor as a part of this Contract.

   B. All things that in the opinion of the Designer may be reasonably inferred from the Plans, Specifications and other Contract Documents are to be executed by the Contractor. The Designer shall determine whether the detail Plans conform to the general Plans and Contract Documents, except as may be otherwise determined by the Awarding Authority.

   C. The tables of contents, titles, headings and marginal notes or sub-scripts contained herein are solely to facilitate references, are not intended to be construed as provisions of the Contract, and in no way affect the interpretation of the provisions to which they refer.

   D. Where reference is made in the Contract Documents to publications, standards, or codes issued by associations or societies, such reference shall be interpreted to mean the current edition of such publications, standards, or codes, including revisions in effect on the date of the Advertisement, notwithstanding any reference to a particular date. The foregoing sentence shall not apply to the dates, if any, specified with respect to insurance policy endorsement forms.

   E. In case of any conflict among the Contract Documents, unless the context clearly otherwise requires, the Contract Documents shall be construed according to the following priorities:

   First Priority: Contract Modifications
   Second Priority: Owner - Contractor Agreement
   Third Priority: General Conditions of the Contract
   Fourth Priority: Drawings -- Schedules take precedence over enlarged detail Drawings, and enlarged Detail Drawings take precedence over reduced scale Drawings; figured dimensions shall prevail over scale.
   Fifth Priority: Specifications

4. Distribution of Work.
The distribution of the Work is intended to be described under the appropriate trades and, except for filed sub-bid work, may be redistributed, except as directed herein, provided that such redistribution shall cause no controversy among the trades and no delay in the progress of the Work.

5. **Contract Price.**
The Contract Price constitutes full compensation to the Contractor for everything to be performed and furnished in connection with the Work and for all damages arising out of the performance of the Work and/or the action of the elements, and constitutes the maximum compensation regardless of any difficulty incurred by the Contractor in connection with the Work or in consequence of any suspension or discontinuance of the Work.

**ARTICLE III: CONTROL OF WORK / ADMINISTRATION OF THE CONTRACT**

1. **Designer.**
Notwithstanding anything to the contrary expressed or implied in this Contract, any of the powers, rights, and duties of the Designer may be exercised by the Awarding Authority, provided that the Awarding Authority shall be under no obligation to do so. The Awarding Authority may rely on the Designer for the performance and exercise of its rights and obligations hereunder and shall be presumed to so rely on the Designer in the absence of an explicit written assumption by the Awarding Authority of any such rights and obligations, except that any Approval required to be obtained from the Awarding Authority hereunder shall not be valid without the signature of the Awarding Authority. The Awarding Authority may explicitly overrule in writing any action, determination or decision of the Designer should the Awarding Authority choose to do so, except to the extent that the same would violate applicable law. Subject to the foregoing, the Designer shall be responsible for the general administration of the Contract and shall perform the duties and exercise the rights herein conferred on the Designer. Except as otherwise specifically provided herein, the Designer shall decide all questions which may arise as to the conduct, quantity, quality, equality, acceptability, fitness, and rate of progress of the several kinds of work and materials to be performed and furnished under this Contract, and shall decide all questions which may arise as to the interpretation of the Plans and Specifications and as to the fulfillment of this Contract on the part of the Contractor. In the case of the death, resignation, inability or refusal of the Designer to act, or the termination of his or her or its employment, the Awarding Authority may appoint another person to act as Designer for the purposes of this Contract. The Awarding Authority shall give written notice to the Contractor of any such appointment.

2. **Right of Access to Work.**
The Awarding Authority and the Designer (and persons designated by them) may for any purpose enter upon the Work, the Site, and premises used by the Contractor, and the Contractor shall provide safe facilities therefore. Other contractors of the Awarding Authority may also enter upon the same for the purposes which may be required by their contracts or work. Any differences or conflicts which may arise between the Contractor and other contractors of the Awarding Authority with respect to their work shall be initially resolved by the Designer.

3. **Inspection No Waiver.**
No inspection by the Awarding Authority or the Designer or employees or agents of either of them, and no order, measurement, certificate, approval, payment order, payment, acceptance or any other action or inaction of any of them, shall operate as a waiver by the Awarding Authority of any provision of this Contract.

**ARTICLE IV: GENERAL PERFORMANCE OBLIGATIONS OF THE CONTRACTOR**
The Contractor shall complete for the Contract Price all of the Work in a proper, thorough, and workmanlike manner in accordance with the Contract Documents. Without limiting the foregoing and without limiting the Contractor's obligations under any other provision of the
Contract Documents, the Contractor shall for the Contract Price perform the following general obligations:

1. **Review of Contract Documents and Field Conditions.**
   A. Before commencing the Work, the Contractor shall carefully study the Contract Documents and carefully compare all Specifications, Plans, Drawings, figures, dimensions, lines, marks, scales, directions of the Designer, and any other information provided by the Awarding Authority and shall at once report to the Designer any questions, errors, inconsistencies, or omissions.
   B. Before commencing the Work, the Contractor shall take field measurements and verify field conditions and shall carefully compare such field measurements and conditions and other information known to the Contractor with the Contract Documents and shall at once report to the Designer any questions, errors, inconsistencies, or omissions.

2. **Supervision and Construction Procedures; Coordination; Cutting, and Patching.**
   A. The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and shall have control over, construction means, methods, techniques, sequences and procedures, and shall be responsible for coordinating all portions of the Work under the Contract.
   B. The Contractor shall be responsible for the proper fitting of all Work and the coordination of the operations of all trades, Subcontractors, and materialmen engaged upon the Work. The Contractor shall guarantee to each of its Subcontractors all dimensions which they may require for the fitting of their work to all surrounding work.
   C. All necessary cutting, coring, drilling, grouting, and patching required to fit together the several parts of the Work shall be done by the Contractor, except as may be specifically noted otherwise under any particular filed sub-bid section of the Specifications.
   D. The Contractor shall be responsible to the Awarding Authority for the acts and omissions of the Contractor's employees, agents and Subcontractors, and their agents and respective contractors’ employees, and other persons performing portions of the Work or supplying materials therefore.
   E. The Contractor shall be responsible for the inspection of portions of the Work already performed under this Contract to determine that such portions are in proper condition to receive subsequent Work.
   F. The Contractor shall employ a registered land surveyor to perform any engineering required for establishing grades, lines, levels, dimensions, layouts, and reference points for the trades. The Contractor shall be responsible for maintaining benchmarks and other survey marks and shall replace any benchmarks or survey marks that may have become disturbed or destroyed. The Contractor shall verify the materials shown on the Drawings before laying out the Work and shall be responsible for any error resulting from its failure to exercise this precaution.
   G. Unless otherwise required by the Supplementary General Conditions or the Plans and Specifications, or directed in writing by the Awarding Authority, Work shall be performed during regular Working Hours. However, if the Contractor desires to carry on the Work outside of regular Working Hours or on Saturdays, Sundays, or Massachusetts or federal holidays then the Contractor shall allow ample time to allow satisfactory arrangements to be made for inspecting Work in progress and shall bear the costs of such inspection. The Awarding Authority shall bill the Contractor directly for such costs.
   H. Work performed outside of regular Working Hours without the consent or knowledge of the Awarding Authority shall be subject to additional inspection and testing as directed by the Awarding Authority. The cost of this inspection and testing shall be borne by the Contractor whether the Work is found to be acceptable or not. The Awarding Authority at its election shall be entitled either to issue a credit Change Order to cover such cost or to withhold such cost from any further payments due the Contractor and/or to receive a payment from the Contractor of the amount of such cost.

3. **Superintendent.**
   A. The Contractor shall employ a Superintendent whose appointment shall be subject to the Approval of the Awarding Authority. The Superintendent shall be in attendance at the Site full-time during the performance of the Work. The Superintendent shall represent the Contractor.
Communications given to and from the Superintendent shall be deemed given to and from the Contractor. Important communications shall be confirmed in writing. Other communications shall be similarly confirmed upon written request in each case. The Superintendent shall attend each job meeting. The Superintendent shall be responsible for coordinating all of the Work of the Contractor and the Subcontractors.

**B.** The Superintendent shall be a competent employee regularly employed by the Contractor. The Superintendent shall be licensed in accordance with the Building Code and shall have satisfactorily performed similar duties on previous construction projects similar in type, complexity and scale to the Project. The Superintendent's resume shall be submitted to the Awarding Authority prior to commencement of construction together with such other information as the Awarding Authority may reasonably require in order to determine whether or not to approve of his or her appointment. Any change in the Superintendent shall require the prior consent of the Awarding Authority. The Contractor shall establish an emergency telephone line by which the Awarding Authority, the Designer, or their respective agents may contact the Superintendent during non-working hours.

4. **Labor.**

**A.** The Contractor shall employ only competent workers. The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall certify and insure that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and the Contractor and each of its subcontractors and others working on the Project shall furnish documentation of successful completion of said course by employees working with the first certified payroll report for each employee. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them. Whenever the Awarding Authority shall notify the Contractor in writing that any worker is, in the Designer's opinion, incompetent, unfaithful, disorderly, or otherwise unsatisfactory, such employee shall be discharged from the Work and shall not again be employed on the Project except with the consent of the Awarding Authority.

**B.** The Contractor shall employ a sufficient number of workers to carry on the Work with all proper speed in accordance with Laws, the requirements of the Contract Documents, and the Progress Schedule.

**C.** The Contractor shall procure materials from such sources and shall manage its own forces and the forces of its Subcontractors and any sub-subcontractors in such a manner as will result in harmonious labor relations on the Project Site. The Contractor shall cause persons to be employed in the Work who will work in harmony with others so employed. Should the Work be stopped or materially delayed in the Awarding Authority's reasonable judgment due to a labor dispute, the Awarding Authority shall have the right to require the Contractor to employ substitutes acceptable to the Awarding Authority.

5. **Notices and Permits.**

**A.** The Contractor at its sole cost shall take out and pay for all approvals, permits, certificates and licenses required by Laws, pay all charges and fees, and pay for (or cause the appropriate Subcontractor to pay for) all utilities required for the proper execution of the Work.

**B.** The Contractor shall comply with all Laws and shall give all notices required thereby.

**C.** Except as otherwise specified in this Contract, it is not the Contractor's responsibility to ascertain that the Contract Documents are in accordance with applicable Laws. However, if the Contractor observes that portions of the Contract Documents are at variance with the requirements of Laws, the Contractor shall promptly notify the Designer and Awarding Authority in writing, and necessary changes shall be accomplished by an appropriate Contract Modification.

**D.** If the Contractor performs Work knowing it to be contrary to Laws without giving such notice to the Designer and Awarding Authority, the Contractor shall bear full responsibility for such Work and all costs attributable thereto, including, without limitation, corrections to the Work.

6. **Lines, Marks etc.**

The Contractor shall furnish batter boards and stakes and shall cause to be placed and maintained thereon so as to be easily read, such lines, marks and directions relating to the Work as the Designer shall from time to time direct. The Designer shall establish base lines and benchmarks
on the Drawings for the locations of the Work but all other lines and grades shall be determined by the Contractor.

7. **Excavation.**
The Contractor shall prevent by sheeting and shoring or bracing, if necessary, any caving or bulging of the sides of any excavation made by the Contractor, leaving sheeting and shoring in place, or if any is removed, filling solid the spaces left thereby.

8. **Dewatering/Hoisting/Staging.**
The Contractor shall provide pumping, drainage, and disposal of all water and other flows so that no puddle, nuisance, or damage will be caused by water or flooding. The Contractor shall provide all hoisting equipment and machinery required for the proper execution of the Work. The Contractor shall provide all exterior and interior staging required to be over eight feet in height, except as may be otherwise provided in the Contract Documents.

9. **Corrections to the Work; Inspection No Bar to Subsequent Corrections.**
The Designer's inspection of the Work shall not relieve the Contractor of its responsibilities to fulfill the Contract obligations. Defective work may be rejected by the Designer or Awarding Authority whether or not such work and/or materials have been previously overlooked or misjudged by the Designer and accepted for payment. If the Work or any part thereof shall be found defective at any time before the Final Acceptance of the whole Work, the Contractor shall forthwith cease the performance of any defective work in progress and, whether or not such work is still in progress, shall forthwith correct such defect in a manner satisfactory to the Designer and Awarding Authority. If any material brought upon the Site for use in the Work, or selected for the same, shall be rejected by the Designer as unsuitable or not in conformity with the Contract Documents, or as damaged by casualty or deteriorated due to improper storage at the Site or to any other factor, the Contractor shall forthwith remove such materials from the Site. The Contractor shall pay for the cost of making good all work or property of other contractors or of the Awarding Authority destroyed or damaged by such removal or replacement; repair any injury, defect, omission or mistake in the Work as soon as it is discovered; finish and immediately make good any defect, omission or mistake in the Work; and complete and leave the Work in perfect condition.

10. **Sanitary Facilities.**
The Contractor shall provide and maintain sanitary facilities for all persons employed on the Work, beginning with the first worker at the Site. Said facilities shall meet the following requirements unless otherwise specified in the Supplementary General Conditions or Specifications.

A. There shall be no fewer facilities than the number required by applicable Laws;

B. Facilities shall be kept in a clean sanitary condition at all times and shall be adequately screened to be inaccessible to flies.

(Note: If existing sanitary facilities at the Site are to be used by the Contractor, this requirement will be modified accordingly in the Supplementary General Conditions or Specifications.)

11. **Temporary Offices.**
A. Except as otherwise specified in the Supplementary General Conditions or Specifications, the Contractor shall erect the following temporary offices near the Site as directed by the Awarding Authority and adequately furnish and maintain them in a clean, orderly condition:

1. A Contractor's field office at which Contractor's authorized representative shall be present at all times while work is in progress. Instructions, notices, and other communications delivered there by the Designer or the Awarding Authority shall be deemed delivered to the Contractor. The Contractor shall provide a separate conference room space with a conference table and chairs sufficient to accommodate 12 persons at one time.

2. Office for the OPM, either a separate building or trailer. Such office shall be in close proximity to the Contractor's field office, shall be at least 475 square feet in area, and shall be equipped with partitions to separate it from public access, electric lights, heat, air conditioning, window screens, secure locking devices, and a toilet room with a working
chemical toilet. Such office shall be equipped with the following furniture and equipment in good condition: 2 lockable steel desks, word processor, 2 swivel chairs, two stools, 2 metal plan racks, plan table at least 32 by 84 inches, 2 metal filing cabinets with locks, 12 feet of 10 inch deep shelving, one accurate Fahrenheit thermometer, one electric water cooler with disposable cups and water supply service, one hard hat for each project representative and 6 visitor hard hats, one dry plain paper copy machine with a legal and standard paper tray, and one calculator with paper print out, all of which shall become the property of the Contractor at the conclusion of the Work. (Note: If office space can be assigned in existing buildings at the Project Site, this requirement will be modified accordingly in the Supplementary General Conditions or Specifications.)

B. The Contractor shall relocate the OPM’s trailer at no additional cost to the Owner if the need for relocation arises as determined by the Awarding Authority.

12. Contract Documents and Samples at the Site.
A reasonable number of sets of Contract Documents will be furnished to the Contractor by the Awarding Authority immediately after signing of the Contract, one of which shall be maintained at the Site for reference by authorized representatives of the Awarding Authority. The Contractor shall maintain at the Site for the use and information of the Awarding Authority one record copy of the Drawings, Specifications, Addenda, Change Orders, Approved Shop Drawings, Product Data, Samples, updated Progress Schedule, and all other submittals, all in good order and marked currently to record changes and selections made during construction. These shall be available to the Designer and the Awarding Authority and shall be delivered to the Designer for submittal to the Awarding Authority upon completion of the Work.

13. Telephones.
The Contractor shall provide and maintain separate individual telephone service and pay for all calls relating to the Work. Service and equipment shall meet the requirements, if any, of the Supplementary General Conditions and Specifications and shall include provisions for incoming and outgoing calls: (1) in the Contractor’s field office for the use of its authorized agents and (2) in the OPM’s office for the use of the Designer and authorized agents of the Owner.

14. Health, Safety, and Accident Prevention
A. In performing the Work, the Contractor shall:
   (1) Ensure that no laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his/her health and/or safety as determined under construction safety and health standards promulgated by the U.S. Secretary of Labor by regulation;
   (2) Protect the lives, health, and safety of other persons; and
   (3) Prevent damage to property, materials, supplies, and equipment.
B. For these purposes, the Contractor shall:
   (1) Comply with 84 Stat. 1590, the "Occupational Safety and Health Act of 1970" (OSHA) and with regulations and standards issued by the U.S. Secretary of Labor at 29 CFR Part 1926; and
   (2) Include the terms of this Section 14 in every subcontract so that such terms will be binding on each subcontractor.
   (3) Designate by notice to the Awarding Authority a responsible member of its organization at the Site whose duties shall include ensuring safety, implementation of Contractor’s Safety Plan referenced below and preventing accidents.
C. The Contractor shall maintain an accurate record of exposure data on all accidents incident to the Work resulting in death, traumatic injury, occupational disease, or damage to property, materials, supplies, or equipment, and shall report this data in the manner prescribed by 29 CFR Part 1904. Without limiting the foregoing, the Contractor shall submit to the Awarding Authority without delay verbal and written reports of all accidents involving bodily injury or property damage arising in connection with the Work.
D. In any emergency affecting the safety of persons or property the Contractor shall immediately act in the exercise of reasonable judgment to prevent threatened damage, injury, or loss. The Contractor shall immediately notify the Awarding Authority of such emergency.
E. The Contractor shall be responsible for its Subcontractors’ compliance with the provisions of this Section 14.

F. Before commencing any portion of the Work the Contractor shall submit a written Project-specific plan for implementing this Section 14. The plan shall include an analysis of the significant hazards to life, limb and property inherent in the performance of the Work and a plan for controlling these hazards.

G. Without limiting the foregoing provisions of this Section 14, the Contractor shall comply with all health and safety Laws applicable to the Work. Without limitation,

(1) If the Contractor uses, stores or encounters toxic or hazardous substances it shall comply with M.G.L. c. 111F, s. 2, the "Right to Know" law and regulations promulgated by the Department of Public Health, 105 CMR 670, the Department of Environmental Protection, 310 CMR 33, and the Department of Labor and Workforce Development, 441 CMR 21; and shall post a Workplace Notice obtainable from the Department of Labor and Workforce Development.

(2) The Contractor shall comply with the Federal Resource Conservation and Recovery Act, the Federal Comprehensive Environmental Response, Compensation and Liability Act, M.G.L. c. 21C, M.G. L. c. 21E, and any other Laws affecting toxic or hazardous materials, solid, special or hazardous waste (collectively "Hazardous Materials Laws). Should the Contractor discover unforeseen materials subject to Hazardous Materials Laws at the Site, the Contractor shall immediately comply with any and all requirements for dealing with such materials and notify all required governmental authorities and the Awarding Authority of such discovery.

(3) The Contractor shall be responsible for the location of all utilities in connection with the Work. Without limiting the foregoing, the Contractor shall comply with Dig-Safe Laws. Dig-Safe is the Utility Underground Plant Damage Prevention System, 331 Montvale Road, Woburn, MA, 01801, 1-888-344-7233. The Contractor shall notify Dig-Safe of contemplated excavation, demolition, or explosive work in public or private ways, and in any utility company right of way or easement, by certified mail, with a copy to Department of Environmental Protection (DEP). This notice shall be given at least 72 hours prior to the work, but not more than sixty days before the work is to be done. Such notice shall state the name of the street or the route number of the way and shall include an accurate description of the location and nature of the proposed work. Dig-Safe is required to respond to the notice within 72 hours of receipt by designating the location of pipes, mains, wires or conduits at the Site. The Contractor shall not commence work until Dig-Safe has responded. The work shall be performed in such manner and with reasonable precautions taken to avoid damage to utilities under the surface at the work location. The Contractor shall provide the Superintendent with current Dig-Safe regulations, and a copy of M.G.L. c. 82, s. 40. Any costs related to the services performed by Dig-Safe shall be borne by the Contractor.

(4) The Contractor shall comply with M.G.L. c. 149, s. 129A, relative to shoring and bracing of trenches.

H. Without limiting the Contractor’s responsibilities described above, the Contractor shall take all reasonable precautions for the safety of, and the prevention of injury or damage to (1) all agents and employees and contractors on the Work and all other persons who may be affected thereby including the general public, (2) all the Work and all materials and equipment to be incorporated therein, whether in storage on or off the Site, under the care custody or control of the Contractor or any of its Subcontractors or any contractors directly or indirectly contracting through any of them, and (3) other property at the Site or adjacent thereto, including but not limited to trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of the Work. The Contractor shall promptly remedy all damage or loss to any such property caused in whole or in part by the Contractor, any Subcontractor, or anyone directly or indirectly contracted or employed by any of them or by anyone for whose acts any of them may be liable. Without limiting the foregoing, the Contractor shall:

(1) post and maintain adequate danger signs and other warnings against hazards;

(2) promulgate safety regulations and give appropriate notices to the Awarding Authority and users of adjacent utilities and property;
(3) insure the adequate strength and safety of all scaffolding, staging and hoisting equipment, temporary shoring, bracing and tying;
(4) protect adjoining private or public property;
(5) provide barricades, temporary fences, and covered walkways required by prudent construction practices, Laws and/or the Contract Documents;
(6) furnish approved hard hats and other personal protective equipment, furnish approved first aid supplies, furnish the name of the first aid attendant, and maintain a posted list of emergency facilities;
(7) provide proper means of access to property where the existing access is cut off by the Contractor;
(8) maintain from the beginning of any darkness or twilight through the whole of every night sufficient lights on or near any obstruction so as to guard and protect travelers from injury from such obstruction;
(9) maintain adequate security at the Site so as not to expose the Work and surrounding property to vandalism or malicious mischief;
(10) provide adequate fire protection procedures during the use of cutting torches, welding equipment, plumbers’ torches and other flame and spark producing apparatus;
(11) take prompt action to correct any dangerous or hazardous conditions.

I. The Contractor shall not use or store explosives in the performance of the Work unless the Contractor first obtains the Awarding Authority's prior written specific Approval. If the Awarding Authority Approves the use or storage of explosives during the performance of the Work, the Contractor shall first comply with all Laws and obtain all permits, approvals, and certificates required in connection with the same and shall exercise best efforts, including but not limited to the employment and supervision of properly qualified personnel, to prevent damage, injuries, and accidents involving said explosives.

J. The Contractor shall not permit cutting or welding in or immediately adjacent to existing property of the Owner, Awarding Authority or of anyone else without the Awarding Authority's prior Approval in each instance.

15. Debris and Chemical Waste.
   A. The Contractor shall not permit the accumulation of interior or exterior debris. The Contractor shall keep the Work area clean at all times. Without limitation, garbage shall be removed daily.
   B. The Contractor shall properly classify and remove debris and waste from the Site and transport and dispose of it, all in accordance with Laws, employing a qualified and properly licensed transporter, at any landfill, disposal or recycling facility licensed under applicable Laws, including without limitation, hazardous materials laws. The Contractor shall make all arrangements and give and obtain all notices, communications, documentation, permits, certificates, and approvals necessary for said disposal from the owner or officials in charge of such landfills, disposal or recycling facilities. The Contractor shall bear all fees and costs in connection with such classification, removal, transportation, disposal and storage. The Contractor shall not permit any storage of debris or waste except in accordance with Laws.
   C. The Contractor shall not permit any open fire on the Site.
   D. Chemical Waste: Chemical waste shall be stored in corrosion resistant containers, removed from the Site, and disposed of not less frequently than monthly unless more frequently required by Laws, including without limitation, hazardous materials laws, or by the Supplementary General Conditions or Specifications. Disposal of chemical waste shall be performed in accordance with requirements of the U.S. Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (DEP). Fueling and lubricating of vehicles and equipment shall be conducted in a manner that affords the maximum protection against spills and evaporation. Lubricants shall be disposed of in accordance with procedures meeting all applicable Laws. The Contractor shall immediately notify the Designer of any hazardous materials release large enough to require reporting under applicable Laws. The Contractor shall be responsible for immediately cleaning up in accordance with Laws any oil or hazardous materials releases resulting from its operations. Any costs incurred in cleaning up any such releases shall be borne by the Contractor.

16. Weather Protection (M.G.L. c. 149, s. 44G and 44F (1)).
The Contractor shall furnish and install "weather protection," which means temporary protection of that Work adversely affected by moisture, wind and cold. Weather protection shall be achieved by covering, enclosing and/or heating working areas such that a minimum temperature of 40 degrees Fahrenheit is maintained at the working surface during the months of November through March in order to permit construction to be carried on during such period in accordance with the Progress Schedule. After the building or portion thereof is completely enclosed by either permanent construction or substantial temporary materials having a resistance comparable to the specified permanent construction, the Contractor shall provide heat therein of not less than 55 degrees F. nor more than 75 degrees F. The foregoing provisions do not supersede any specific requirements for methods of construction, curing of materials and the like. Such weather protection shall be consistent with the Progress Schedule, shall permit the continuous progress of the Work necessary to maintain an orderly and efficient sequence of construction operations, shall include one thermometer for every 2,000 square feet of floor space or fraction thereof, shall be subject to the Approval of the Awarding Authority, and shall meet such additional requirements as may be specified by the Supplementary General Conditions or the Specifications.

17. **Furnishings and Equipment.**
When, in the opinion of the Designer, any portion of the Work is in a reasonable condition to receive fittings, furniture, or other property of the Owner not covered by this Contract, the Contractor shall allow the Awarding Authority to bring such fittings, furniture, and/or other property into such portions of the Work and shall provide all reasonable facilities and protection thereof. No such occupancy shall be construed as interfering with the provisions relating to time of completion, or as constituting an acceptance of the whole or any part of the Work. Any furniture or fittings so installed shall be placed in the Work at the risk of the Awarding Authority except that the Contractor shall be liable for damages or losses to such furniture or fittings to the extent such damages or losses arise in whole or in part from the negligence or intentional misconduct of Contractor, Subcontractors, their agents and/or employees, or anyone for whose acts Contractor is responsible.

18. **Form for Sub-contract.**
The Contractor when subcontracting with sub-bidders filed pursuant to M.G.L. c. 149, s. 44F shall use the form for sub-contract in M.G.L. c. 149, s. 44F(4) (c). The Contractor shall not interpret paragraph 3 of the statutory form of Subcontract to require such sub-bidders to provide insurance with limits higher than the limits that are required by Article XIV of these General Conditions of the Contract assuming that the term “Contractor” refers to the sub-bidder and that the term “Contract Price” refers to the sub-bidder’s price stated in paragraph 1 of the statutory form of Subcontract.

19. **Sales Tax Exemption and Other Taxes.**
All building materials and supplies as well as the rental charges for construction vehicles, equipment and machinery rented exclusively for use on the Site, or while being used exclusively for the transportation of materials for the Work are entitled to an exemption from sales taxes under M.G.L. c. 64H, s. 6(f). The Contractor shall take all action required to obtain the benefit of such sales tax exemption. The Contractor shall bear the cost of any sales taxes that Contractor incurs in connection with the Work and the Awarding Authority shall not reimburse the Contractor for any such taxes. The exemption number assigned to the Contractor as an exempt purchaser shall be provided to the Contractor by the Awarding Authority upon the written request of the Contractor.

20. **Final Cleaning.**
At the completion of the Work, the Contractor shall remove all waste materials, rubbish, tools, equipment, machinery and surplus materials, and professionally clean all sight-exposed surfaces so that the Work is clean and ready for occupancy. Subsequent to installation of furniture, telephones, and equipment, the Contractor shall provide such additional cleaning as may be necessary to remove any soil resulting from installation of such furniture, telephones and equipment.

21. **Maintenance Data.**
Subject to such additional requirements as may be provided in the Supplementary General Conditions or Specifications, the Contractor shall compile 3 complete and identical binders of operating and maintenance data for the entire Work. The Contractor shall submit record maintenance data to the Designer for approval, shall submit approved maintenance data to the Awarding Authority, and shall instruct and train the Awarding Authority’s personnel in proper inspection and maintenance procedures.

22. Closeout Procedures.
The Contractor shall take all actions and submit all items required for the issuance of the Certificate of Use and Occupancy and Final Acceptance as specified in the Contract Documents.

23. Risk of Loss.
The Contractor shall bear all risk of loss to the Work during the term of the Contract except for any portion of the Work as to which the Certificate of Occupancy has been issued pursuant to Article VI of these General Conditions of the Contract. Nothing herein shall limit the Contractor’s responsibilities under Article IX or XV of these General Conditions of the Contract.

ARTICLE V: MATERIALS AND EQUIPMENT

1. Materials Generally.
   A. Unless otherwise specifically provided in the Contract Documents, the Contractor shall provide and pay for materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.
   B. Materials and equipment to be installed as part of the Work (both or either of which are hereinafter referred to as “materials”) shall be new, unused, of recent manufacture, assembled, and used in accordance with the best construction practices. The Contractor shall give a preference in the purchase of supplies and materials, other considerations being equal, in favor, first, of supplies and materials manufactured and sold within the Commonwealth, and, second, of supplies and materials manufactured and sold elsewhere within the United States.

2. Shop Drawings, Product Data, and Samples.
   A. The Contractor shall furnish to the Designer all samples of the materials to be used in the execution of the Work as required by the Contract Documents. The Contractor shall furnish to the Designer in a timely manner all coordination Drawings, shop details, Shop Drawings, and setting diagrams which may be necessary for acquiring and installing materials. These shall be reviewed as required by the Designer. A minimum of four (4) copies shall be submitted for final approval, one of which shall be returned to the Contractor, one to the OPM, one to the Awarding Authority and one filed with the Designer. The inspection and approval by the Designer of Shop Drawings, etc. shall be general and shall in no way relieve the Contractor from responsibility for proper fitting, coordinating, construction, and construction sequencing. The Contractor shall furnish to the Designer such information and vouchers relative to the Work, the materials therefore, and the persons employed thereon, as the Designer shall from time to time request.
   B. Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. The purpose of their submission is to demonstrate for those portions of the Work for which submittals are required the way the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents.
   C. The Contractor shall review, approve, and submit to the Designer, Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Awarding Authority or of separate contractors. Submittals made by the Contractor which are not required by the Contract Documents or which do not comply with the Contract Documents may be returned without action. The Contractor’s attention is directed to the provisions of Section 4 of this Article V and to the Specifications.
   D. The Contractor shall prepare and keep current for the Designer’s approval a schedule of submittals which is coordinated with the Progress Schedule and allows the Designer reasonable time to review submittals.
E. The Contractor shall perform no portion of the Work requiring submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Designer. Such Work shall be in accordance with Approved submittals.

F. By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents that the Contractor has determined and verified materials, field measurements, and field construction criteria related thereto and has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

G. The Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Designer's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Designer in writing of such deviation at the time of submittal and the Awarding Authority has given explicit written approval to the specific deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals by the Designer's or the Awarding Authority's actions.

H. The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Designer on previous submittals.

I. Informational submittals upon which the Designer is not expected to take responsive action may be so identified in the Contract Documents.

J. When professional certification of performance criteria of materials, systems or equipment is required by the Contract Documents, such certification must be stamped by a registered Massachusetts professional in the discipline required. The Designer shall be entitled to rely upon the accuracy and completeness of such calculations and certifications.

K. Materials furnished or used or employed under the Contract must be equal in quality to the samples furnished and be satisfactory to the Designer.

3. Tests.

A. Any material to be used in the Work may be tested or inspected at any time by the Designer with the prior Approval of the Awarding Authority and may be rejected if it fails to comply with specified tests. The Awarding Authority shall pay for all testing of specified material. If the Contractor requests permission to use a material that was not specified, then the Contractor shall pay for such testing. The cost of testing of materials that fail the testing criteria shall be borne by the Contractor.

B. The Contractor shall notify the Designer and the Awarding Authority of the proposed sources of materials in time to permit all required testing and inspection before the material is needed for incorporation into the Work. The Contractor shall have no claim arising from Contractor's failure to designate the proposed source or to order the material in time for adequate testing and inspection. Necessary arrangements shall be made to permit the Designer to make factory, shop or other inspection of materials or equipment ordered for the Work in process of manufacture or fabrication, or in storage elsewhere than the Site.

4. "Or Equal" Submissions.

A. Where products or materials are prescribed by manufacturer name, trade name, or catalog reference, the words "or Approved equal" shall be understood to follow. An item shall be considered equal to the item so named or described if in the opinion of the Awarding Authority (a) it is at least equal in quality, durability, appearance, strength and design, (b) it performs at least equally the function imposed in the general design for the Work, and (c) it conforms substantially, even with deviations, to the detailed requirements for the items as indicated by the Specifications. Any structural or mechanical changes made necessary to accommodate products or materials substituted as an "or equal" shall be at the expense of the Contractor. "Approved equal" shall mean an item with respect to which the Awarding Authority shall have issued a written statement to the Contractor to the effect that the item is, in the Awarding Authority's opinion, equal within the meaning of this paragraph to that prescribed in the Contract Documents.

B. The Contractor shall be responsible for providing the Designer with any information and test results that the Designer reasonably requires to determine whether or not a material is equal to a material named or described in the Contract Documents.
C. Whenever the Contractor submits a material for approval as a substitute for a material named or described in the Contract Documents, such submission shall be made at least sixty (60) days prior to the date the materials will be used in the Work. In no event shall the Contractor maintain a claim for delays based upon the Designer's review of such substituted materials if the Contractor has failed to comply with the sixty (60) day submission requirement.

D. The Contractor shall save the written calculations, pricing information, and other data that the Contractor used to calculate the General Bid (the "Bid Pricing Materials") for at least six years after the Awarding Authority makes Final Payment under this Contract. No increase in the Contract Price shall be allowed for any material later found to have been improperly rejected as not being equal unless the Contractor can show persuasive evidence that the rejection increased the Contractor's costs over those provided for in the Bid Pricing Materials, net of all savings the Contractor obtained by substituting other "or-equal" items. Without limiting the foregoing, if the Awarding Authority rejects a proposed substitution on the basis that the item is not equal and if the appropriate authority finds that the proposed substitution was equal, the Contract Price may be increased only to the extent that (1) the item that the Contract Documents specifically require costs more than the item later approved as equal, (2) the Bid Pricing Materials prove that the Contractor calculated its bid using the cost of the item later found as equal, (3) any increase is reduced by any cost that the Contractor would have incurred for structural or mechanical changes necessary to accommodate the substitute item, (4) the Contractor shall not be entitled to any adjustment for overhead and profit, (5) any increase must exceed the aggregate amount that the Contractor saved using products or materials that the Awarding Authority approved as equal under this Contract. In calculating the Contractor's aggregate saving under the preceding clause (5), the Contractor shall provide the Awarding Authority with the Bid Pricing Materials and a calculation based on the Bid Pricing Materials that compare the price (stated in the Bid Pricing Materials) of each item replaced with an "or equal" item, with the cost of the approved equal item, specifically describes all costs that Contractor would have incurred making structural or mechanical changes to include within the Work the item later found to have been improperly rejected and copies of all plans, specifications, shop Drawings, and other design documents that the Awarding Authority deems necessary or desirable.


A. Materials and equipment shall be progressively delivered to the Site so that there will be neither delay in the progress of the Work nor an undue accumulation of materials that are not to be used within a reasonable time and so that their security, quality, and fitness of the materials for the Work is preserved.

B. Materials stored off Site shall be insured and stored at the expense of the Contractor so as to guarantee the preservation of their security, quality and fitness for the Work. Without derogating from the Contractor's responsibilities in the previous sentence, when necessary to avoid deterioration or damage, material (on or off Site) shall be placed on wooden platforms or other hard clean surfaces and not on the ground and shall be properly protected.

C. Expenses for inspection of material by the Designer and/or the Awarding Authority personnel including travel, quarters, and subsistence shall be borne by the Contractor requesting the inspection of material stored outside the Commonwealth of Massachusetts as part of the Contract Price. The policy of the Awarding Authority precludes the payment for material stored outside the boundaries of Massachusetts except in extremely limited circumstances with the express written consent of the Awarding Authority. If the Contractor requests an inspection of material stored outside the Commonwealth of Massachusetts, the Awarding Authority will initially pay for all expenses of inspecting the material incurred by the Designer and/or Awarding Authority's personnel including travel, quarters, and subsistence. The Awarding Authority will then give Contractor an invoice for those costs and the Contractor shall submit a credit Change Order for the amount of those expenses.

D. Stored materials either at the Site or at some other location agreed upon in writing shall be so located as to facilitate prompt inspection and even though approved before storage, may again be inspected prior to their use in the Work.

E. All storage sites shall be restored to their original condition by the Contractor at the Contractor's expense.
F. The Contractor shall take charge of and be liable for any loss of or injury to the materials for his use delivered to or in the vicinity of the place where the Work is being done, whether furnished by the Owner or otherwise; the Contractor shall notify the Designer as soon as any such materials are so delivered, allow them to be examined by the Designer, and furnish workers to assist therewith.

6. Defective, Damaged, or Deteriorated Materials and Rejection Thereof.
The Designer or Awarding Authority may reject materials if either reasonably determines that such materials do not conform to the Contract Documents in any manner, including but not limited to materials that have become damaged or deteriorated from improper storage whether or not such materials have previously been accepted. The Contractor at its own expense shall remove rejected materials from the Work. No rejected material, the defects of which have been subsequently corrected, shall be used except with the written permission of the Designer. Should the Contractor fail to remove rejected material within a reasonable time, the Designer and/or Awarding Authority may, in addition to any other available remedies, remove and/or replace the rejected material, and to deduct the cost of such removal and/or replacement from any moneys due or to become due the Contractor. No extra time shall be allowed for completion of Work by reason of such rejection. The inspection of the Work shall not relieve the Contractor of any of its obligations herein prescribed, and any defective Work shall be corrected. Work not conforming to the Contract Documents may be rejected notwithstanding that such Work and materials have been previously overlooked or misjudged by the Designer and accepted for payment. If the Work or any part thereof shall be found defective at any time before Final Acceptance of the whole Work, the Contractor shall forthwith make good such defect in a manner satisfactory to the Designer. Nothing in the Contract shall be construed as vesting in the Contractor any property rights in the materials used after they have been attached or affixed to the Work or the Site; but all such materials shall upon being so attached or affixed become a property of the Owner.

ARTICLE VI: PROSECUTION AND PROGRESS

1. Beginning, Progress Schedule, and Completion of Work.
   A. The Contract time shall commence upon the date specified in the Notice to Proceed. The Contractor shall begin Work at the Site within ten days of said date unless otherwise ordered in writing by the Awarding Authority.
   B. Within ten days after the Work has commenced, the Contractor shall submit to the Designer and to the Awarding Authority, a progress schedule for the term of the Contract as required by the Contract Documents, showing in detail his proposed progress for the construction of the various parts of the Work and the proposed times for receiving required materials. Upon Approval by the Awarding Authority, said schedule shall constitute the Progress Schedule. The Contractor shall at the end of each month, or more often if required, furnish to the Designer and to the Awarding Authority a schedule meeting the requirements of the Specifications showing the actual progress of the parts of the Work in comparison with the Progress Schedule.
   C. Time is of the essence of this Contract. The Work shall be completed within the time specified in Article 2 of the Owner - Contractor Agreement. Should the Contractor require additional time to complete the Work, the Contractor shall document the reasons therefore and submit a written request for an extension of time within 20 days of the occurrence of the event alleged to be the cause of the delay, as provided in this Article and in Article VII of these General Conditions of the Contract. Failure to submit said written request within the time required by the preceding sentence shall preclude the Contractor from subsequently claiming any time extension due to said delay.
   D. If, in the opinion of the Designer or the Awarding Authority, the Contractor fails to comply with the Progress Schedule, the Awarding Authority may give the Contractor a notice specifying the time limits and performance standards that the Contractor is failing to meet whereupon (1) the Contractor shall, if the notice requires, discontinue all or any portion of the Work (which discontinuance shall neither terminate the Contract nor give the Contractor any claim for an
increase in the Contract Price, damages, or an extension of any completion deadlines); or (2) at Contractor's sole cost increase the work force, equipment and plant, or any of them, employed on the whole or any part of the Work, to the extent required by such notice, and employ the same from day to day until the completion of the Work or such part thereof, or until the failure regarding the rate of progress, in the opinion of the Designer or the Awarding Authority, shall have been sufficiently corrected.

E. If, in the opinion of the Awarding Authority, the Contractor fails to comply with the Progress Schedule, and whether or not the Awarding Authority shall have given the Contractor a notice described in D above, the Awarding Authority may (but shall not be required to) give the Contractor notice of such failure and five days to cure the same. Unless the Contractor shall within that five days take all necessary steps to do so (including, if the Awarding Authority requires, increasing its forces, equipment and plant) and continue to do so until in the opinion of the Awarding Authority the failure is corrected, the Awarding Authority may at the Contractor's expense and without terminating this Contract take exclusive or joint possession of all or a portion of the Site and employ and direct the labors of existing or such additional forces, equipment and plant as may in the Designer's or Awarding Authority's opinion be necessary to insure the completion of the Work or such part thereof within the time specified in the Contract Documents or at the earliest possible date thereafter. The Awarding Authority may exercise its rights under this Article at any time and from time to time without waiving any of its rights under this Contract, at law or in equity, including, without limitation, the right to deem this Contract terminated or to order the Contractor to discontinue the Work at any time thereafter. The Contractor shall continue to perform the remaining Work under this Contract even if the Awarding Authority elects to have another contractor perform a portion of the Work under this Article.

F. The Awarding Authority shall deduct the cost of any actions the Awarding Authority takes under this Article from any amount then due or which might have become due to the Contractor under this Contract had the Contractor performed as required. On demand, the Contractor shall pay the Awarding Authority any amount by which the cost of completing all or any portion of the Work exceeds the amount attributable to that Work under the Contract Documents. The Awarding Authority's sole goal will be to complete the Work that it elects to complete within the time limits stated in the Contract or at the earliest possible date thereafter. Consequently, the Awarding Authority shall have no obligation to obtain competitive bids or the lowest cost for completing the Work or any part thereof. The Awarding Authority's election to complete all or part of the Work shall not release the Contractor from any liability for failure to complete the Work as the Contract Documents require, and shall not entitle the Contractor to a claim for an increase in the Contract Price or an extension of the time for completing the Work. If the cost that the Awarding Authority incurs in completing all or any portion of the Work is less than the amount that the Contract Documents attribute to that Work, the Awarding Authority will pay or credit the difference to the Contractor, less any other costs and expenses that the Awarding Authority incurs, including the cost of supervision, and the Designer’s and attorneys' fees and costs.

2. Failure to Complete Work on Time - Liquidated Damages.

A. If liquidated damages are specified in the Owner - Contractor Agreement, the Awarding Authority has determined that its damages as a result of Contractor's failure to complete the Work to the point at which it qualifies for the issuance of a Certificate of Use and Occupancy will be difficult or impracticable to ascertain. Accordingly, if the Work is not completed to such point by the date specified in this Contract, the Contractor shall pay to the Awarding Authority the sum designated as liquidated damages in the Contract for each and every calendar day that the Contractor is in default in completing the Work to such point. Such monies shall be paid as liquidated damages, not as a penalty, to cover losses and expenses to the Awarding Authority and/or the User Agency resulting solely from the fact that the Work is not completed on time.

B. Similarly, if the Contract states that by a specified date a designated portion of the Work shall be prosecuted to the point at which it qualifies for the issuance of a Certificate of Agency Use and Occupancy, and if such portion has not been prosecuted to such point by said date, the Contractor shall pay to the Awarding Authority the sum designated in the Contract for each calendar day that the Contractor is in default in completing such portion of the Work to such
point. Such monies shall also be paid as liquidated damages not as a penalty, to cover losses and expenses to the Owner resulting solely from the fact that the Work is not completed on time.

C. The Awarding Authority may recover such liquidated damages by deducting the amount thereof from any moneys due or that might become due the Contractor, and if such moneys shall be insufficient to cover the liquidated damages, then the Contractor or the Surety shall pay to the Awarding Authority the amount due.

D. Permitting the Contractor to continue and finish the Work or any portion of it after the time fixed in the Contract for its completion shall not be deemed as a waiver of any of the Owner's rights hereunder, at law or in equity.

E. Liquidated damages or a portion thereof may be waived by the Awarding Authority if the Contractor submits evidence satisfactory to the Awarding Authority that the delay was caused solely by conditions beyond the control of the Contractor and that the Awarding Authority has not suffered any damages as a result of said delay.

F. Failure by the Awarding Authority to specify a sum as liquidated damages in the Owner - Contractor Agreement, or the insertion of "N/A" or "none" in the space provided therein for liquidated damages, shall not be deemed a waiver of the Awarding Authority's right to recover actual damages arising from the Contractor’s failure to complete the Work on time.

3. Delays; Statutory Provisions (M.G.L. c. 30, s. 390).

A. Notwithstanding any provision of this Contract to the contrary, except as otherwise provided by law as set forth in paragraph B below, the Contractor shall not be entitled to increase the Contract Price or to receive damages on account of any hindrances or delays, avoidable or unavoidable; but if any delay is caused in the opinion of the Designer by the Awarding Authority, the Contractor shall be entitled to an extension of time. The length of the extension shall be sufficient in the opinion of the Designer for the Contractor to complete the Work. Although no delay shall increase the Contract Price, the Awarding Authority may require that any change in the date by which the Contractor must complete all or any part of the Work be processed on a standard Change Order form.

B. If a suspension, delay, interruption or failure to act of the Awarding Authority increases the cost of performance to any Subcontractor, that Subcontractor shall have the same rights against the Contractor with respect to such increase as the Contractor shall have against the Awarding Authority by virtue of (a) and (b) of M.G.L. c. 30, s. 390 set forth below, but nothing in provisions (a) and (b) shall alter any other rights which the Contractor or the subcontractor may have against each other. As used in the statutory language of (a) and (b) below, "contract" means this Contract, "general contractor" means the Contractor and "awarding authority" means the Awarding Authority:

"(a) The awarding authority may order the general contractor in writing to suspend, delay, or interrupt all or any part of the work for such period of time as it may determine to be appropriate for the convenience of the awarding authority; provided, however, that if there is a suspension, delay or interruption for fifteen days or more or due to a failure of the awarding authority to act within the time specified in this contract, the awarding authority shall make an adjustment in the contract price for any increase in the cost of performance of this contract but shall not include any profit to the general contractor on such increase; and provided further, that the awarding authority shall not make any adjustment in the contract price under this provision for any suspension, delay, interruption or failure to act to the extent that such is due to any cause for which this contract provides for an equitable adjustment of the contract price under any other contract provisions.

(b) The general contractor must submit the amount of a claim under provision (a) to the awarding authority in writing as soon as practicable after the end of the suspension, delay, interruption or failure to act and, in any event, not later than the date of final payment under this contract and except for costs due to a suspension order, the awarding authority shall not approve any costs in the claim incurred more than twenty days before the general contractor notified the awarding authority in writing of the act or failure to act involved in the claim."

4. Use and Occupancy Prior to Final Acceptance.

A. The Contractor agrees to the use and occupancy of the Project or any portion thereof before Final Acceptance of the Work by the Awarding Authority.
B. The Awarding Authority will cooperate with the Contractor with respect to the completion of the Work by taking such reasonable steps as may be possible to avoid interference with the Contractor’s Work provided that they do not interfere with the proper functioning of the facility.

C. The Contractor shall not be responsible for wear and tear or damage resulting solely from temporary occupancy.

D. Use and occupancy of any part of the Work prior to Final Acceptance by the Awarding Authority shall not relieve the Contractor from maintaining the required payment and performance bonds and insurance (to the extent that insurance is required to be maintained after Substantial Completion) required by this Contract.

   A. When the Work, or portion thereof which the Awarding Authority agrees to accept separately has reached the state of Substantial Completion as shown on Approved payment request, the Contractor shall develop, with the participation of the Designer and the Awarding Authority, the Punch List identifying those items of unfinished or unacceptable Work that remain to be performed or corrected under the Contract.
   B. Before the Work shall be deemed completed to the point where it is ready for the issuance of a Certificate of Occupancy, the Contractor shall:
      (1) Provide Contractor’s proposed Punch List containing a statement of the reason for each item listed thereon;
      (2) Advise the Awarding Authority of proposed changes in insurance in accordance with the provisions of this Contract, and provide to the Awarding Authority evidence of Contractor’s Completed Operations insurance coverage to the extent required by the Contract Documents;
      (3) Execute and submit a notarized warranty on a form provided by the Awarding Authority meeting the requirements of Article IX of these General Conditions of the Contract, to commence upon the date of the issuance of the Certificate of Occupancy for the Work or the designated portion thereof, unless otherwise provided in the Certificate of Occupancy;
      (4) Submit signed special warranties and warranties of longer than one year as required by the Contract Documents;
      (5) Submit signed maintenance agreements for all portions of the Work specified to receive maintenance after the issuance of the Certificate of Occupancy;
      (6) Submit all preliminary record Drawings and documents and framed data in the forms required by the Contract Documents to the Awarding Authority and Designer;
      (7) Complete all items required to be completed by the New Bedford Department of Inspectional Services and obtain a Certificate of Occupancy from the Department of Inspectional Services and similar releases which permit the Awarding Authority full and unrestricted use of the areas claimed to be ready for occupancy;
      (8) Deliver specified maintenance stocks of materials, required spare parts, and all special tools furnished by manufacturers to persons designated by the Awarding Authority and obtain written receipts for same;
      (9) Make final changes of lock cylinders or cores and advise the Awarding Authority of the change of project security responsibility;
      (10) Complete start-up of systems and instruct Awarding Authority personnel on proper operation and routine maintenance of all systems and equipment and notify the Awarding Authority that start-up and instruction have been completed;
      (11) Remove all remaining temporary facilities that are no longer needed, surplus materials, and debris; (the Contractor shall not remove construction offices and trailers without the prior Approval of the Awarding Authority);
      (12) Submit final utility meter readings and similar information and advise the Awarding Authority of the change of responsibility for utility charges and payments upon the issuance of the Certificate of Occupancy;
      (13) Complete final clean-up of all Work, restoration of damaged finishes, and replacement of all damaged and broken glass not listed on the Contractor's Punch List.
      (14) Complete such other items as may be called for in the Supplementary General Conditions, if any, or in the Specifications.
C. After completing the items specified in subsection A above, the Contractor shall make a written request for the Designer's inspection for a Certificate of Occupancy in accordance with the Contract Documents. The Designer shall review the submittals and the Work and shall either 1) sign a Certificate of Occupancy or 2) notify the Contractor of incomplete and/or incorrect Work that must be completed and corrected prior to the issuance of the Certificate of Occupancy. The Designer shall notify the Contractor of any additions to the Punch List. In connection with the execution of the Certificate of Occupancy the Designer shall assign dollar values to each item on the Punch List. Failure to include any incomplete or defective item on the Punch List shall not relieve the Contractor of the obligation to complete all Work in accordance with the Contract Documents.


A. Prerequisites for Final Acceptance. After the issuance of a Certificate of Occupancy for the entire Work, and after the Contractor has completed all of the Work required by this Contract, including Change Orders and Punch List Items, the Contractor shall submit the following completed items to the Awarding Authority together with such additional items as may be specified in the Contract Documents:

1. A completed Final Application for Payment showing a final accounting of all changes in the Work, on the form provided by the Awarding Authority.
2. Certification and satisfactory evidence that all taxes, fees, and similar obligations have been paid.
3. Consent of the Surety to Final Payment executed by applicable bonding companies.
4. Certified copy of the Punch List stating that the Contractor has completed or corrected every item listed.
5. Evidence of Contractor's continuing Completed Operations Insurance coverage to the extent required by the Contract Documents.
6. All final record Drawings and documents in the forms specified by the Contract Documents.
7. A notarized certification that all purchases made under the tax exemption certificate were legitimate and entitled to exemption.
8. Written certifications from the Department of Inspectional Services and the Designer to the effect that: a) the Work has been inspected for compliance with the Contract Documents and has satisfied the Department of Inspectional Services; b) all equipment and systems included in the Work have been tested in the presence of the Designer and are operational and satisfactory; c) the Work is completed and ready for final inspection.
9. Such other items as may be required by the Contract Documents.

B. Re-inspection; Final Acceptance. After notification from the Contractor that all remaining contract exceptions, omissions and incomplete items have been completed (with the exception of Contractor's continuing warranty, insurance, indemnification, and such other obligations as are intended by the terms of the Contract Documents to extend beyond the date of Final Acceptance), the Awarding Authority and the Designer shall inspect the Work to verify the completion of the same. If the Work is satisfactory, the Awarding Authority shall prepare a Certificate of Final Acceptance or shall notify Contractor of items which remain to be completed prior to Final Acceptance.

7. One-Year Warranty Repair List and Inspection.

Approximately 30 days prior to the expiration of the comprehensive one-year warranty period, the Contractor shall schedule an appointment with the Awarding Authority for a re-inspection of the Work with the Awarding Authority, and shall thereafter inspect the work at the time scheduled. Based on this inspection and on prior inspections, the Awarding Authority shall issue a "Warranty Repair List" of items to be corrected by the Contractor. The Contractor shall make the repairs and/or replacements listed within 30 days of the issuance of the Warranty Repair List unless otherwise agreed by the Awarding Authority in writing.

ARTICLE VII: CHANGES IN THE WORK

A. No changes in the Work shall be made in absence of a Change Order (sometimes called a "Notice to Proceed") defined in Article I of these General Conditions of the Contract, directing the Contractor to perform such changes. A request for a change in the provisions of this Contract may be submitted to the Awarding Authority by the Contractor, Designer, or OPM. The request must be made in writing and in accordance with the provisions of this Contract, Laws, and the procedures of the Awarding Authority.

B. A Change Order may be issued by the Awarding Authority for changes in the Work within the scope of the Contract, including but not limited to, changes in: (1) the Plans and Specifications; (2) the method or manner of performance of the Work; (3) the Owner-furnished facilities, equipment, materials, services or Site; (4) the schedule for performance of the Work.

C. The Contractor shall immediately perform any Change Order work that is ordered by the Awarding Authority.

D. Whenever a Change Order is issued and said Change Order will cause a change in the Contractor’s cost, the Contractor or the Awarding Authority may request an equitable adjustment in the Contract Price. A request for such an adjustment shall be in writing and shall be submitted by the party making such claim to the other party before commencement of the pertinent work or as soon thereafter as possible.

E. The Awarding Authority and the Contractor shall negotiate in good faith an agreement on an equitable adjustment in the Contract Price, and/or time if appropriate, before commencement of the pertinent work or as soon thereafter as is possible. In the absence of an agreement for an equitable adjustment, the Awarding Authority shall unilaterally determine the costs attributable to the change and provide the Contractor with a written notice to that effect. The Contractor may appeal the decision of the Awarding Authority within thirty days of receipt of said notice, to the chief executive official of the Awarding Authority or his designee. However, if the Contractor shall exercise its rights to appeal the decision of the Awarding Authority as aforesaid, the Contractor shall be required to engage in the mandatory mediation procedures set forth in Section 5 of this Article VII.

F. During the negotiation of an equitable adjustment in the Contract Price, the Contractor shall, if requested, provide the Awarding Authority with all cost and pricing data used by him in computing the amount of the equitable adjustment, and the Contractor shall certify that the pricing data used was accurate, complete and current. If the Awarding Authority subsequently determines that the data submitted by the Contractor was incomplete, incorrect or not current, the Awarding Authority may exclude such data from consideration under the equitable adjustment request.


A. Equitable adjustments in the Contract Price shall be determined according to one of the following methods, or a combination thereof, as determined by the Awarding Authority: (1) fixed price basis, provided that the fixed price shall be inclusive of items (a) through (e) below and shall be computed in accordance with those provisions; (2) estimated lump sum basis to be adjusted in accordance with Contract unit prices or other agreed upon unit prices provided that the unit prices shall be inclusive of all costs related to such equitable adjustment; (3) time and materials basis to be subsequently adjusted on the basis of actual costs (but subject to a predetermined "not to exceed limit") calculated as follows:

- (a) the direct cost (or credit) for labor at the minimum wage rates established for this Contract pursuant to M.G.L. c. 149, s 26-27H, and the direct cost for material and use of equipment;
- (b) plus (or minus) the cost of Workmen’s Compensation Insurance, Liability Insurance, Federal Social Security and Massachusetts Unemployment Compensation, or as an alternative the Contractor may elect to use a flat 30% of the total labor rate computed in accordance with subparagraph (a) above;
- (c) plus an allowance equal to 20% of the amount of (a) above for overhead, superintendence and profit; (In the case of Item 1 work, which is the work of the Contractor and all his non-filed Subcontractors, said 20% allowance shall be paid to the Contractor and the Contractor and said non-filed Subcontractors shall agree upon the distribution of this amount as a matter of contract between them. In the case of Item 2 work, which is work performed by a Subcontractor filed pursuant to M.G.L. c. 149, s. 44F, said 20% allowance shall be paid to the filed Subcontractor, it being understood that this provision does not apply to other Subcontractors including sub-Subcontractors listed under paragraph E of the form for sub-Bid);
(d) plus, for work performed by a Subcontractor filed pursuant to M.G.L. c. 149, s. 44F, an additional allowance equal to 7% of the sum of (a) through (c) above as full compensation to the Contractor for processing forms and assuming full responsibility for the faithful performance of such work by said filed Subcontractor(s); (e) plus (or minus) the actual direct premium cost of payment and performance bonds required of Contractor and filed Subcontractors for this Contract.

B. If the net change is an addition to the Contract Price, it shall include the Contractor’s overhead, superintendence and profit. On any change that involves a net credit, no allowance for overhead, superintendence and profits shall be included. For any change that does not include labor performed or materials installed in the project, there will be no markup for the Contractor’s overhead, superintendence, and profit, even though there may be a net increase in the Contract Price. Charges for small tools known as “tools of the trade” are not to be computed in the amount of any change in the Contract Price.

C. Statutory Contract adjustments made under the provisions of M.G.L. c. 149, s.44F shall not be considered Change Orders and shall not entitle the Contractor to any adjustments for overhead, profit, and superintendence, although the Awarding Authority may require that such Contract adjustments be processed on standard Change Order and equitable adjustment forms.

The Contractor agrees to perform all Work as directed by the Awarding Authority, and if the OPM determines that certain Work that the Contractor believes to be or to warrant a Change Order under this Article does not represent a change in the Work, the Contractor shall perform said Work. The Contractor shall be deemed to have concurred with the OPM’s determination as aforesaid unless the Contractor shall perform Work under protest in compliance with the following sub-paragraphs (1) and (2) below:

(1) If the Contractor claims compensation for a change in the Work that is not deemed by the OPM to be a change or to warrant additional compensation as claimed by the Contractor, the Contractor shall on or before the first working day following the commencement of any such work or the sustaining of any such damage submit to the Designer, OPM and the Awarding Authority a written statement of the nature of such work or claim. The Contractor shall not be entitled to additional compensation for any work performed or damage sustained for which written notice is not given within the time limit specified in the preceding sentence, even though similar in character to work or damage with respect to which notice is timely given.

(2) On or before the second working day after the commencement of such work or the sustaining of such damage, and daily thereafter, the Contractor shall file to the extent possible with the OPM, the Designer, and the Awarding Authority, itemized statements of the details and costs of such work performed or damage sustained.

A. Criminal Penalties: The Contractor’s attention is directed to M.G.L. c. 30, s. 39I, which provides criminal penalties for unauthorized deviations from the Plans and Specifications, and to M.G.L. c. 30, s. 39J. The Contractor’s attention is also directed to M.G.L. 266, s. 67B which provides criminal penalties for false claims by Contractor under this Contract: "Whoever makes or presents to any employee, department, agency or public instrumentality of the commonwealth, or of any political subdivision thereof, any claim upon or against any department, agency, or public instrumentality of the commonwealth, or any political subdivision thereof, knowing such claim to be false, fictitious, or fraudulent, shall be punished by a fine of not more than ten thousand dollars or by imprisonment in the state prison for not more than five years, or in the house of correction for not more than two and one-half years, or both."

B. Differing Site Conditions (M.G.L. c. 30, s. 39N): "If, during the progress of the work, the contractor or the awarding authority discovers that the actual subsurface or latent physical conditions encountered at the Site differ substantially or materially from those shown on the plans or indicated in the contract documents either the contractor or the contracting authority may request an equitable adjustment in the contract price of the contract applying to work affected by the differing Site conditions. A request for such an adjustment shall be in writing and shall be delivered by the party making such claim to the other party as soon as possible after
such conditions are discovered. Upon receipt of such a claim from a contractor, or upon its own initiative, the contracting authority shall make an investigation of such physical conditions, and, if they differ substantially or materially from those shown on the plans or indicated in the contract documents or from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the plans and contract documents and are of such a nature as to cause an increase or decrease in the cost of performance of the work or a change in the construction methods required for the performance of the work which results in an increase or decrease in the cost of the work, the contracting authority shall make an equitable adjustment in the contract price and the contract shall be modified in writing accordingly."

C. Timely Decision By Awarding Authority (M.G.L. c. 30, s. 39P): "Every contract subject to section thirty-nine M of this chapter or section forty-four A of chapter one hundred forty-nine which requires the awarding authority, any official, its architect or engineer to make a decision on interpretation of the specifications, approval of equipment, material or any other approval, or progress of the work, shall require that the decision be made promptly and, in any event, no later than thirty days after the written submission for decision; but if such decision requires extended investigation and study, the awarding authority, the official, architect or engineer shall, within thirty days after the receipt of the submission, give the party making the submission written notice of the reasons why the decision cannot be made within the thirty day period and the date by which the decision will be made."

5. Mandatory Mediation.
In the case of every dispute where the dollar amount in dispute (or the estimated dollar value of the extension of time in dispute) is $50,000 or more and the Contractor appeals the decision of the chief executive officer of the Awarding Authority or his designee described in Section 4.B above, the Awarding Authority and the Contractor shall engage in good faith in a non-binding mediation process, which process shall be concluded within sixty days from the date that the Contractor files an appeal from said decision as provided in Section 4.B above. In the case of such disputes where the dollar amount in dispute (or the estimated dollar value of the extension of time in dispute) is $500,000 or more, the parties shall, if the mediation process fails, submit the dispute to a third-party Neutral which shall within sixty days render a non-binding advisory opinion. Unless the parties have previously agreed in writing to a process for submitting disputes to mediation, the Awarding Authority shall determine in its reasonable discretion the procedures to be followed and shall give the Contractor notice of the same in writing within 7 days of the date that the Awarding Authority receives notice of the Contractor's appeal from the decision of the chief executive officer of the Awarding Authority or his designee. The mediator shall be selected jointly by the parties to this Contract. The cost of the services of any mediator selected jointly by the parties to this Contract or jointly by mediators selected by the parties to this Contract shall be borne equally by the Contractor and the Awarding Authority.

ARTICLE VIII: PAYMENT PROVISIONS

1. Schedule of Values.
Before the first application for payment the Contractor shall submit to the Designer and the Awarding Authority a schedule of values allocated to various portions of the Work in sufficient detail to reflect the various major components of each trade (with filed Subcontractors as well as MBE/WBE noted), including quantities when requested, aggregating the total Contract Price and divided so as to facilitate payments for work under each section of the Specifications. The schedule shall be prepared in such form and supported by such data to substantiate its accuracy as the Designer or the Awarding Authority may require. Each item in the schedule shall include its proper share of overhead and profit. When Approved by the Designer and the Awarding Authority, it shall constitute the Schedule of Values and shall be used only as a basis for the Contractor's requests for payments.

2. Payment Liabilities of Contractor.
A. The Contractor shall pay to the Owner all expenses, losses and damages, as determined by the Awarding Authority or the Designer, incurred in consequence of any default, defect,
omission or mistake of the Contractor or his employees or Subcontractors or the making good thereof.

B. If the Work (or a portion thereof) is not completed to Substantial Completion and the Contractor has not satisfied the requirements for the issuance of a Certificate of Occupancy by the date specified in Article 2 of the Owner - Contractor Agreement, the Contractor shall pay to the Owner liquidated damages as provided in Article VI, Section 2 of these General Conditions of the Contract.

3. Retention of Moneys by Awarding Authority.
   A. The Awarding Authority may keep any moneys which would otherwise be payable at any time hereunder, and apply the same, or so much as may be necessary therefore, to (1) the Owner's expenditures for the Contractor's account, (2) to secure the Awarding Authority's remedies against the Contractor for the Contractor's breach of its obligations under this Contract or the breach of any person performing any part of the Work and (3) the payment of any expenses, losses or damages incurred by the Awarding Authority or any agency of the Commonwealth as a result of the failure of the Contractor to perform its obligations hereunder. The Awarding Authority may retain, until all claims are settled, such moneys as the Awarding Authority estimates to be the fair value of the Awarding Authority's claims against the Contractor, and of all claims for labor performed or furnished and for materials used or employed in or in connection with the Work and for the rental of vehicles, appliances and equipment employed and for the employment of substitute contractors and labor in connection with the Work filed in accordance with M.G.L. c. 30, s. 39A and s. 39F. The Awarding Authority may make such settlements and apply thereto any moneys retained under this Contract.

   B. The Contractor shall each week examine all claims so filed, and if the same are in any respect incorrect or do not correctly show the amount due from the Contractor to the claimant for such labor and materials, the Contractor shall forthwith file with the Awarding Authority a separate written statement of all inaccuracies in each claim and of the correct amount due from the Contractor to each claimant therefore, and shall immediately file a statement of all payments thereafter made to such claimants. Each such statement shall be sworn to and contain a detailed breakdown required by M.G.L. c. 30 s. 39F(d) and (e). Unless such statements are so filed by the Contractor the amount shown by the claims filed shall at the option of the Awarding Authority be conclusively deemed to be the accurate amount due from the Contractor therefore in all accounting with the Awarding Authority. If the moneys retained under this Contract are insufficient to pay the sums found by the Awarding Authority to be due under the claims for labor and materials filed as aforesaid, the Awarding Authority may, at its discretion, pay the same, and the Contractor shall repay to the Awarding Authority all sums paid out. The Awarding Authority may also at its discretion use any moneys retained, due or to become due under this Contract, for the purpose of paying for both labor and materials used or employed in the Work for which claims have not been filed with the Awarding Authority.

   C. No moneys retained under the provisions of this Article shall be held to be statutory security for the payment of claims filed in accordance with the provisions of M.G.L. c. 149, s. 29, as amended, for which security is provided by bond.

4. Applications for Payment.
   A. The Contractor shall, once in each month on the day of the month corresponding to the day of the month specified in the Notice to Proceed referenced in Article 2 of the Owner - Contractor Agreement, on forms provided and in the manner prescribed by the Awarding Authority, submit to the Awarding Authority a statement showing the total amount of Work done to the time of such estimate and the value thereof as approved by the OPM and the Designer. It shall be the sole responsibility of the Contractor to deliver or cause to be delivered to the OPM (the "designee" as provided by M.G.L. c. 30, s. 39K) said periodic estimate in proper form, approved as provided above and arithmetically correct. All periodic estimates shall contain such certifications and other evidence supporting the Contractor's right to payment as the Awarding Authority may require, including without limitation, lien waivers and other evidence, on such forms as the Awarding Authority may require, establishing that title to the equipment or materials is unencumbered and has been transferred to the Owner. If there is no OPM assigned to the Contract, the Designer shall be the designee. If there is neither an OPM nor a Designer the designee shall be a person designated by the Awarding Authority at the project field office or
alternatively the home office of the Awarding Authority. The Contractor shall include in such periodic estimate only such materials as are incorporated in the Work, except as provided in paragraph C below. The Awarding Authority shall retain five percent of such estimated value as part security for the completion of the Work and shall pay to the Contractor while carrying on the Work the balance not retained as aforesaid, subject to the Approval of the Awarding Authority after deducting therefrom all previous payments and all sums to be kept under the provisions of this Contract.

B. Each periodic estimate shall constitute the Contractor's representation that (1) the payment then requested to be disbursed has been incurred by the Contractor on account of the Work and is justly due to Subcontractors or, to the Contractor in the case of other Work performed by the Contractor on account thereof, (2) the materials, supplies and equipment for which Application for Payment is being submitted have been installed or incorporated into the Work or have been stored at the Site or at such off Site storage locations as the Awarding Authority shall have Approved, (3) the materials, supplies and equipment are insured in accordance with the provisions of this Contract, (4) the materials, supplies and equipment are owned by the Owner and are not subject to any liens or encumbrances, (5) the Work which is the subject of such periodic estimate has been performed in accordance with the Contract Documents and (6) that all due and payable bills with respect to the Work have been paid to date or shall be paid from the proceeds of such periodic estimate. The Contractor's attention is directed to the criminal penalties for false claims referenced in paragraph A above.

C. The Contractor may include in a periodic estimate the value of materials or equipment delivered at the Site (or at some location agreed to in writing) only upon delivery to the Awarding Authority of: (1) an acceptable transfer of title on the form provided by the Awarding Authority; (2) written certification by the Contractor (or applicable subcontractor) on the form provided by the Awarding Authority that the Contractor (or the Subcontractor which executed the transfer of title) is the lawful owner and that the materials or equipment are free from all encumbrances, accompanied by receipted invoices or other acceptable proof of prior payment for such materials; (3) a stored materials insurance binder that covers the materials for which payment is requested, that names the Owner as an insured party should the stored materials be subjected to any casualty, loss, or theft prior to their inclusion in the Work. The material(s) or equipment must, in the judgment of the Designer (1) meet the requirements of the Contract, including prior shop drawing, product data, and sample approval, (2) be ready for use, and (3) be properly stored by the Contractor and be adequately protected until incorporated into the Work. See also Article V.5.C of these General Conditions of the Contract concerning the cost of inspections.

D. The Awarding Authority may make changes in any periodic estimate submitted by the Contractor in accordance with M.G.L. c. 30, s. 39K (see below) and the payment due shall be computed in accordance with the changes so made. The provisions of said section 39K shall govern payments on which the Awarding Authority has made changes.

E. No certificate for payment and no progress payment shall constitute acceptance of Work that is not in accordance with the Contract Documents.

F. The Contractor and all Subcontractors furnishing labor on this Contract agree to furnish certified payroll reports if requested to do so, at no additional expense to the Awarding Authority. The Awarding Authority may at all reasonable times audit such reports.

5. Periodic Payments (M.G. L. c. 30, s. 39K).
The Awarding Authority shall make payment to the Contractor in accordance with M.G.L. c. 30, s. 39K.

6. Payment of Subcontractors (M.G.L. c. 30, s. 39F).
The Contractor shall make payments to Subcontractors in accordance with M.G.L c.30, s. 39F which is quoted in this section below. For the purposes of this Contract, the word "forthwith" appearing in paragraph (1) (a) of c. 30, § 39F shall be deemed to mean "within five (5) business days."

7. Final Payment; Release of Claims by Contractor.
Upon Final Acceptance of the Work the Contractor shall be entitled to payment of the balance of the Contract Price. Final payment shall be as provided in this Article above and in accordance with any process set forth in the Supplementary General Conditions. The Contractor agrees to
execute a Certificate of Final Inspection, Release (with Contractor’s own exceptions listed thereon) and Acceptance as a condition precedent to Final Payment. The acceptance by the Contractor of the Final Payment made as aforesaid, or the execution of the Certificate of Final Acceptance by the Contractor, shall constitute a release of the Owner, the Awarding Authority, the Designer, and every member and agent of any of them, from all claims of and liability to the Contractor for anything done or furnished for or relating to the Work, or for any act or neglect of the Owner, the Designer, or of any person relating to or affecting the Work, except the claim against the Owner or the Designer for the remainder, if any there be, of the amounts set forth by the Contractor in the Certificate of Final Inspection, Release and Acceptance. Final Acceptance shall not relieve Contractor of the requirements of Articles IX, XIV, and XV of these General Conditions of the Contract, or of other provisions of this Contract, to the extent that the same are intended to survive Final Acceptance.

ARTICLE IX. GUARANTEES AND WARRANTIES

1. General Warranty.
If at any time during the period of one (1) year from the date of the issuance of the Certificate of Occupancy by the Awarding Authority or the date of Final Acceptance, whichever occurs first, any part of such Work shall in the reasonable opinion of the Awarding Authority be defective or require replacing or repairing, or damage to other property of the Owner is caused by any defect in the Work, the Awarding Authority shall notify the Contractor in writing to make the required repairs or replacements and repair such damage. If the Contractor shall neglect to commence such repairs or replacements to the satisfaction to the Awarding Authority within ten (10) days from the date of the giving of such notice, then the Awarding Authority may employ other persons to make the same. The Contractor agrees, upon demand, to pay to the Awarding Authority all amounts which it expends for such repairs, replacements, and/or damages. During this one-year guarantee period any corrective work shall be performed under all the applicable terms of this Contract, and if Change Orders are issued in accordance with the terms of this Contract, the Contractor shall be entitled to compensation for special insurance, as required. This one-year guarantee shall not limit any express guaranty or warranty provided elsewhere in the Contract.

2. Special Guarantees and Warranties.
A. The Contractor’s obligation to correct Work as set forth in paragraph 1 above is in addition to, and not in substitution of, such guarantees or warranties as may be required in the various sections of the Specifications.
B. Guarantees and warranties required in the various sections of the Specifications must be delivered to the Owner before final payment to the Contractor may be made, or in the case of guarantees and warranties which originate with a subcontractor’s section of the Work, before final payment for the amount of that subtrade or for the phase of Work to which the guarantee or warranty relates.
C. The failure to deliver a required guarantee or warranty shall constitute a failure to fully complete the Work in accordance with the Contract Documents and a breach of the Owner-Contractor General Contract.

ARTICLE X: MISCELLANEOUS LEGAL REQUIREMENTS.

1. Contractor to be Informed.
The Contractor shall inform itself of all existing and future Laws in any manner affecting those engaged or employed in the Work, or the materials used or employed in the Work, or in any way affecting the conduct of the Work, and of all orders and decrees of bodies or tribunals having any applicable jurisdiction or authority over the Work.

2. Compliance with all Laws.
The Contractor shall cause all persons employed in the performance of the Work to comply with all existing and future Laws, including but not limited to those set forth below:
A. Corporate Disclosures. The Contractor, if a foreign corporation, shall comply with M.G.L. c. 181, s.3 and s. 5, and M.G.L. c. 30, s.39L.
A ½. Employment Eligibility Verification
The Contractor shall comply with Federal Department of Homeland Security Requirements in hiring any and all “Employees” to be employed in the Project who are required to be listed in the certified payroll reports for the Project. Such compliance shall include, but not be limited to the faithful completion of the Federal Department of Homeland Security Form I-9 process by the Contractor for each of its Employees. The Contractor shall execute a Certificate of Compliance with Employment Eligibility Verification Requirements (I-9 Certificate) with the execution of its Contract. The Contractor shall require each of its subcontractors and sub subcontractors to execute and provide to Contractor an I-9 Certificate with the execution of each subcontract, and Contractor shall immediately provide a copy to the Awarding Authority. Contractor acknowledges that the weekly workforce report form contained in the contract documents, which must be submitted by the Contractor on a weekly basis, contains a statement that the Form I-9 process was faithfully completed for all employees listed on the weekly certified payroll report. By the signature of the Contractor’s Authorized Signatory on the I-9 Certificate, the Contractor certifies under the pains and penalties of perjury that the Contractor shall not knowingly use undocumented workers in connection with the performance of this contract; that pursuant to federal requirements, the Contractor shall verify the immigration status of all workers assigned to the contract without engaging in unlawful discrimination; and that the Contractor shall not knowingly or recklessly alter, falsify, or accept altered or falsified documents from any such worker. The Contractor understands and agrees that breach of any of these terms during the period of a contract may be regarded as a material breach, subjecting the Contractor to sanctions, including but not limited to monetary penalties, withholding of payments, contract suspension or termination.

B. Veterans Preference. In the employment of mechanics and apprentices, teamsters, chauffeurs, and laborers in the performance of Work in the Commonwealth, preference shall first be given to citizens of the Commonwealth who have been residents of the Commonwealth for at least six months at the commencement of their employment and who are veterans as defined M.G.L. c.4, s.7 (34), 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.

C. Prevailing Wages. The Contractor shall comply with M.G.L. c. 149, s. 26-27H. The prevailing wage schedule is found in Exhibit A to the Instructions to Bidders, listing the prevailing minimum wage rates that must be paid to all workers employed in the Work. The Awarding Authority is not responsible for any errors, omissions, or misprints in the said schedule. Such Schedule shall continue to be the minimum rate wages payable to workers employed in the Work throughout the term of this Contract, subject to the exceptions provided in M.G.L c.149, s. 26-27H. The Contractor shall not have any claim for extra compensation from the Owner if the actual wages paid to workers employed in the Work exceeds the rates listed on the schedule or as otherwise provided by law. The Contractor shall cause a copy of said Schedule to be kept in a conspicuous place at the Site during the term of the Contract. If reserve police officers are employed by the Contractor, they shall be paid the prevailing wage of regular police officers. (See M.G.L c.149, s.34B).

D. Payroll Records and Statement of Compliance. The Contractor shall comply and shall cause its Subcontractors to comply with Massachusetts General Law c. 149, s. 27B, which requires that a true and accurate record be kept of all persons employed on the a project for which the prevailing wage rates have been provided. The Contractor and all Subcontractors shall keep these records and preserve them for a period of three years from the date of completion of the Contract. Such records shall be open to inspection by any authorized representative of the Owner at any reasonable time, and as often as may be necessary. The Contractor shall, and shall cause its subcontractors to, submit weekly copies of their weekly payroll records to the Awarding Authority. In addition, the Contractor and each Subcontractor shall furnish to the Awarding Authority within fifteen days after completion of its portion of the Work a signed Statement of Compliance in the form required by c. 149, § 27B.
E. Vehicle operators. If the Director of the Department of Labor and Workforce Development has established a Schedule of wage rates to be paid to the operators of trucks, vehicles or equipment for the Work, the Contractor shall be obligated to pay such operators at least the minimum wage rate contained on such Schedule. (See M.G.L. c.149, s.26-27H).

F. Eight Hour Day. The Contractor shall comply with M.G.L. c. 149, s. 30, 34 and 34A which provide that no laborer, workman, mechanic, foreman or inspector working within the Commonwealth in the employ of the Contractor, subcontractor or other person doing or contracting to do the whole or part of the Work shall be required or permitted to work more than eight hours in any one day or more than forty-eight hours in any one week, or more than six days in any one week, except in cases of extraordinary emergency.

G. Timely Payment of Wages. The Contractor shall comply with, and shall cause its Subcontractors to comply with M.G.L. c. 149, s. 148 which requires the weekly or biweekly payment of employees within six days of the end of the pay period during which wages were earned if employed for five or six days of a calendar week, and within other periods of time under certain circumstances as set forth therein.

H. Lodging, etc. The Contractor shall comply with, and shall cause its Subcontractors to comply with, M.G.L. c. 149, s. 25 which provides that every employee under this Contract shall lodge, board and trade where and with whom he elects, and neither the Contractor nor his agents or employees shall, either directly or indirectly, require as a condition of the employment of any person that the employee shall lodge, board or trade at a particular place or with a particular person.

I. Truck Rates. The use by the Contractor of trucks or other motor vehicles hired from either common or contract motor carriers in the course of performance of this Contract is subject to such minimum rates and charges, and rules and regulations as may from time to time be promulgated by the Department of Public Utilities of the Commonwealth of Massachusetts or other agency of the State of Federal government which may be authorized by law to set rates or otherwise regulate the use of such vehicles. The Contractor expressly assumes the risk of any additional expense that may arise by reason of any change in such minimum rates and charges, and rules and regulations, and shall be entitled to no additional compensation or reimbursement by reason thereof.

ARTICLE XI: CONTRACTOR'S ACCOUNTING METHOD REQUIREMENTS (M.G.L. c. 30, s. 39R)

1. Definitions. The words defined herein shall have the meaning stated below whenever they appear in this Article XI:

   -- "Contractor" means any person, corporation, partnership, joint venture, sole proprietorship, or other entity awarded a Contract pursuant to M.G.L. c. 30, s. 39M, M.G.L. c. 149, s. 44A-J, and M.G.L. c. 7, s. 30B-P.

   -- "Contract" means any Contract awarded or executed pursuant to M.G.L. c. 30, s. 39M, M.G.L. c. 149, s.44A-J, and M.G.L. c. 7, s. 30B-P, which is for an amount or estimated amount greater than one hundred thousand dollars.

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

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

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

or other person or persons primarily responsible for the financial and operational policies and practices of the Contractor.

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

2. Record Keeping.
   A. The Contractor shall make, and keep for at least six years after final payment, books, records, and accounts that in reasonable detail accurately and fairly reflect the transactions and dispositions of the Contractor.
   B. Until the expiration of six years after final payment, the Inspector General, DCAM, and the Awarding Authority shall have the right to examine any books, documents, papers or records of the Contractor and Subcontractors that directly pertain to, and involve transactions relating to the Contractor and Subcontractors.
   C. The Contractor shall describe any change in the method of maintaining records or recording transactions which materially affects any statements filed with the Awarding Authority including the date of the change and reasons therefore, and shall accompany said description with a letter from the Contractor's independent certified public accountant approving or otherwise commenting on the changes.
   D. The Contractor represents that it has, prior to the execution of the Contract, filed a statement of management on internal accounting controls as set forth in Section 3 below.
   E. The Contractor represents that it has, prior to the execution of the Contract, filed an audited financial statement for the most recent completed fiscal year as set forth in section 4 below and will continue to file such statement annually during the term of the Contract.

   A. The Contractor shall file with the Awarding Authority a statement of management as to whether the system of internal accounting controls of the Contractor and its subsidiaries reasonably assures that:
      (1) transactions are executed in accordance with management's general and specific authorization;
      (2) transactions are recorded as necessary to: (a) to permit preparation of financial statements in conformity with generally accepted accounting principles, and (b) to maintain accountability for assets;
      (3) access to assets is permitted only in accordance with management's general or specific authorization; and
      (4) the recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action was taken with respect to any difference.
   B. The Contractor shall file with the Awarding Authority a statement prepared and signed by an independent certified public accountant, stating that the accountant has examined the statement of management on internal accounting controls, and expressing an opinion as to:
      (1) whether the representations of management in response to subparagraph 3 above are consistent with the results of management's evaluation of the system of internal accounting controls; and
      (2) whether such representations of management are reasonable with respect to transactions and assets in amounts which would be material when measured in relation to the applicant's financial statement.

   A. Every Contractor awarded a contract shall annually file with DCAM during the term of the Contract a financial statement prepared by an independent certified public accountant on the basis of an audit by such accountant. The final statement filed shall include the date of final payment. All statements shall be accompanied by an accountant's report.
B. The office of Inspector General and DCAM shall have the right to enforce the provisions of this Article. A Contractor's failure to satisfy any of the requirements of this section may be grounds for debarment pursuant to M.G.L. c. 149, s. 44C.

The Contractor shall save the written calculations, pricing information, and other data that the Contractor used to calculate the bid that induced the Awarding Authority to enter into this Contract (the "Bid Pricing Materials") for at least six years after the Awarding Authority makes final payment under this Contract.

ARTICLE XII: INSURANCE REQUIREMENTS

1. Insurance Generally.
   A. The Contractor shall take out and maintain the insurance coverages listed in this Article with respect to the operations as well as the completed operations of this Contract. This insurance shall be provided at the Contractor's expense and shall be in full force and effect for the full term of the Contract or for such longer period as this Article requires.
   B. All policies shall be written on an occurrence basis and be issued by companies authorized to write that type of insurance under the laws of the Commonwealth and rated in Best's Insurance Guide (or any successor thereto or replacement thereof) as having a general policy holder rating of "A" or better and a financial rating of at least "9" or otherwise acceptable to the Awarding Authority.
   C. Contractor shall submit three originals of each certificate of insurance, acceptable to the Awarding Authority, simultaneously with the execution of this Contract. Certificates shall show the Awarding Authority and the Owner as an additional insured as to all policies of liability insurance and shall state that Contractor has paid all premiums and that none of the coverages shall be cancelled, terminated, or materially modified unless and until 30 days prior notice is given in writing to the Awarding Authority. Contractor shall submit updated certificates prior to the expiration of any of the policies referenced in the certificates so that the Awarding Authority shall at all times possess certificates indicating current coverage. Certificates shall indicate that the contractual liability coverage, and Contractor's Protective Liability coverage is in force. Certificates shall include specific acknowledgment that the following coverages are included in the policies:
   -Contractual liability
   -Contractor's protective
   -Owner as additional insured by form CG2010 (11/85 ed.) to the general liability
   -Owner as additional insured to automobile liability, umbrella liability, and pollution liability
   -General Liability is endorsed with CG2404, Waiver of Subrogation, in favor of the Owner
   -Builder's Risk or Installation Floater includes Owner, Contractor and subcontractors of any tier as named insureds. Builder’s Risk or Installation floater is on an All Risk basis including earthquake and flood.
   D. The Contractor shall file one certified copy of all policies with the Awarding Authority within sixty days after Contract award. If the Awarding Authority or the Owner is damaged by the Contractor's failure to maintain such insurance and to comply with the terms of this Article, then the Contractor shall be responsible for all costs and damages to the Owner attributable thereto.
   E. Termination, cancellation, or material modification of any insurance required by this Contract, whether by the insurer or the insured, shall not be valid unless written notice thereof is given to the Awarding Authority at least thirty days prior to the effective date thereof, which shall be expressed in said notice.

2. Contractor's Commercial General Liability.
   A. The Contractor shall provide the following minimum general liability coverage with respect to the operations performed by Contractor and any employee, subcontractor, or supplier, unless a higher coverage is specified in Exhibit A to the Owner - Contractor Agreement, in which case the Contractor shall provide the additional coverage:

   Bodily Injury & $1,000,000 each occurrence
### Property Damage
- General Aggregate: $2,000,000 (per project)
- Products & Completed Operations: $1,000,000 (annual aggregate)
- Personal & Advertising Injury: $1,000,000 (each occurrence)
- Medical Expenses: $10,000

### B. This policy shall include coverage relating to explosion, collapse, and underground property damage.

### C. This policy shall include contractual liability coverage.

### D. The completed operations coverage shall be maintained for a period of three (3) years after Substantial Completion.

### E. If the Work includes work to be performed within 50 feet of a railroad, any exclusion for liability assumed under contract for work within 50 feet of a railroad shall be deleted.

### F. This policy shall include endorsement CG2010 (10/85 edition), Owner as Additional Insured and CG2404 (11/85 edition) Waiver of Subrogation in Favor of Owner.

### 3. Vehicle Liability.
- A. The Contractor shall provide the following minimum coverage with respect to the operations of any employee, including coverage for owned, non-owned, and hired vehicles, unless a higher coverage is specified in Exhibit A to the Owner - Contractor Agreement, in which case the Contractor shall provide the additional coverage:
  - Combined Single Limit: $1,000,000

- B. The policy shall include a CA9948 Pollution Endorsement and shall name the Owner as an Additional Insured.

### 4. Pollution Liability.
The Contractor shall provide coverage for bodily injury and property damage resulting from liability arising out of pollution related exposures such as asbestos abatement, lead paint abatement, tank removal, removal of contaminated soil, etc. The Awarding Authority and the Owner shall be named as an additional insured and coverage must be on an occurrence basis. The amount of coverage shall be $1,000,000 per occurrence and $3,000,000 in the aggregate unless a higher amount is specified in Exhibit A to the Owner - Contractor Agreement, in which case the Contractor shall provide the additional coverage.

### 5. Worker's Compensation.
- A. The Contractor shall provide the following coverage in accordance with M.G.L. c.149 §34A and c.152 as amended, unless a higher coverage is specified in Exhibit B to the Owner - Contractor Agreement, in which case the Contractor shall provide the higher coverage:
  - Worker's Compensation
    - Part One: Provide Statutory Minimum
    - Employer's Liability: $500,000 each accident
    - Part Two: $500,000 disease per employee
    - $500,000 disease policy aggregate

- B. If specified in Exhibit A to the Owner - Contractor Agreement the policy must be endorsed to cover United States Longshoremen & Harborworkers Act (USLHW), Maritime Liability for $1,000,000/$1,000,000, or Federal Employer’s Liability Act liability.

- A. The Contractor shall provide coverage against loss or damage on all Work included in this Contract in an amount equal to the Contract Price. Such coverage shall be written on an all risks basis or equivalent form and shall include, without limitation, insurance against perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood (if the project is not in an "A" or a "V" flood Zone), windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a
result of such insured loss. This policy and/or installation floater shall indicate if Stored Materials
coverage is provided as required below.

B. When Work will be completed on existing buildings owned by the Owner, the Contractor
shall provide an installation floater, in the full amount of the Contract Price. Such coverage shall
be written on an all risks basis or equivalent form and shall include, *without limitation, insurance
against perils of fire (with extended coverage) and physical loss or damage including, without
duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood (if the
project is not in an "A" or a "V" flood Zone), windstorm, falsework, testing and startup, temporary
buildings and debris removal including demolition occasioned by enforcement of any applicable
legal requirements, and shall cover reasonable compensation for Architect's and Contractor's
services and expenses required as a result of such insured loss. This policy and/or installation
floater shall indicate if Stored Materials coverage is provided as required below.

C. The Contractor shall maintain insurance on delivered and/or stored material designated to be
incorporated in the Work against fire, theft or other hazards. Any loss or damage of whatever
nature to such material while stored at some approved off Site location shall be forthwith
replaced by the Contractor at no expense to the Awarding Authority.

D. The policy or policies shall specifically state that they are for the benefit of and payable to the
Awarding Authority, Owner, the Contractor, and all persons furnishing labor or labor and materials
for the Contract Work, as their interests may appear. The policy or policies shall list the Awarding
Authority, Owner, the Contractor, and Subcontractors of any tier as named insureds.

E. Coverage shall include any costs for work performed by the Designer or any consultant as the
result of a loss experienced during the term of this Contract.

F. Coverage shall include temporary occupancy and waiver of subrogation.

7. Umbrella Coverage.
The Contractor shall provide Umbrella Coverage in form at least as broad as primary coverages
required by Sections 2, 3 and 5 of this Article in the following amount unless a higher amount is
specified in Exhibit A to the Owner - Contractor Agreement, in which case the Contractor shall
provide the higher amount:

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<th>Umbrella Coverage:</th>
<th>Contract Price:</th>
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<tr>
<td>Under $1,000,000</td>
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8. Additional types of Insurance.
The Contractor shall provide such other types of insurance as may be required by Exhibit Ato the
Owner - Contractor Agreement.

ARTICLE XIII: INDEMNIFICATION

1. Generally.
To the fullest extent permitted by law, the Contractor shall indemnify, defend, and hold harmless
the Owner, Awarding Authority and Designer and their officers, agents, divisions, agencies,
employees, representatives, successors and assigns from and against all claims, damages, losses
and expenses, including but not limited to court costs and attorneys’ fees, arising out of or resulting
from the performance of the Work, including but not limited to those arising or resulting from:
- labor performed or furnished and/or materials used or employed in the performance of the Work;
- violations by Contractor, any Subcontractor, or by any person directly or indirectly employed or
used by any of them in the performance of the Work or anyone for whose acts any of them may be
liable (Contractor, subcontractor and all such persons herein collectively called "Contractor's
Personnel") of any Laws;
- violations of any provision of this Contract by any of Contractor's Personnel;
- injuries to any persons or damage to any property in connection with the Work;
- any act, omission, or neglect of Contractor's Personnel.
The Contractor shall be obligated as provided above, regardless of whether or not such claims, damages, losses and/or expenses, are caused in whole or in part by the actions or inactions of a party indemnified hereunder. In any and all claims by Contractor's Personnel against parties indemnified hereunder, the Contractor's indemnification obligation set forth above shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any subcontractor under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts. Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or person described in this Article XV.

2. Designer's Actions.
The obligations of the Contractor under Section 1 above shall not extend to the liability of the Designer, its agents or employees, arising out of (i) the preparation or approval of maps, Drawings, opinions, reports, surveys Change Orders, designs or specifications, or (ii) the giving of or the failure to give directions or instructions by the Designer, its agents to employees provided such giving or failure to give is the primary cause of the injury or damage.

The provisions of this Article XV are intended to survive Final Acceptance and/or any termination of this Contract.

ARTICLE XIV: PERFORMANCE AND PAYMENT BONDS

1. Contractor Bonds.
   A. The Contractor shall provide performance and payment (labor and materials) bonds in the form provided by the Awarding Authority, executed by a surety licensed by the Commonwealth of Massachusetts Division of Insurance. Each such bond shall be in the amount of the Contract Price.
   B. If at any time prior to final payment to the Contractor, the Surety:
      - is adjudged bankrupt or has made a general assignment for the benefit of its creditors;
      - has liquidated all assets and/or has made a general assignment for the benefit of its creditors;
      - is placed in receivership;
      - otherwise petitions a state or federal court for protection from its creditors; or
      - allows its license to do business in Massachusetts to lapse or be revoked;
      then the Contractor shall, within 21 days of any such action listed above, provide the Awarding Authority with new performance and payment bonds as described in Paragraph A above. Such bonds shall be provided solely at the Contractor's expense.

2. Subcontractor Bonds.
   A. If the Contractor provided in its General Bid that any or all filed subcontractors shall provide the Contractor with payment and performance bonds for the full amount of their respective Subcontracts, then the costs for said bonds shall be the responsibility of the Contractor.
   B. If the Contractor provided in its General Bid that filed Subcontractors shall provide bonds, and subsequently waives the requirement, the Contractor shall give the Awarding Authority a written certification that the Contractor understands that if the filed Subcontractor defaults or is terminated, the Contractor shall have full responsibility for all costs and expenses related to said default or termination but shall be entitled to a credit adjustment to the Contract Price in an amount equal to the bond premium Contractor would have paid had Contractor required the filed Subcontractor to provide such bonds.

ARTICLE XV: TERMINATION OF CONTRACT
1. **Termination for Cause.**

   **A.** The Awarding Authority may without prejudice to any other right or remedy deem this Contract terminated for cause if any of the following defaults shall occur and not be cured within three (3) days after the giving of notice thereof by the Awarding Authority to the Contractor and any surety that has given bonds in connection with this Contract:

   (1) The Contractor has filed a petition, or a petition has been filed against the Contractor with its consent, under any federal or state law concerning bankruptcy, reorganization, insolvency or relief from creditors, or if such a petition is filed against the Contractor without its consent and is not dismissed within sixty (60) days; or if the Contractor is generally not paying its debts as they become due; or if the Contractor becomes insolvent; or if the Contractor consents to the appointment of a receiver, trustee, liquidator, custodian or the like of the Contractor or of all or any substantial portion of its assets and such appointment or possession is not terminated within sixty (60) days; or if the Contractor makes an assignment for the benefit of creditors;

   (2) The Contractor refuses or fails, except in cases for which extension of time is provided under this Contract's express terms, to supply enough properly skilled workers or proper materials to perform its obligations under this Contract, or the Designer has determined that the rate of progress required for the timely completion of the Work is not being met;

   (3) The Contractor fails to make prompt payment to Subcontractors or for materials, equipment, or labor;

   (4) All or a part of the Work has been abandoned;

   (5) The Contractor has sublet or assigned all or any portion of the Work, the Contract, or claims thereunder, without the prior written consent of the Owner, except as expressly permitted in this Contract;

   (6) The Contractor has failed to comply with Laws;

   (7) The Contractor fails to maintain, or provide to the Awarding Authority evidence of the insurance or bonds required by this Contract, or

   (8) The Contractor has failed to prosecute the Work or any portion thereof to the standards required under this Contract or has otherwise breached any material provision of this Contract.

   **B.** The Awarding Authority shall give the Contractor and any surety notice of such termination, but the giving of notice of such termination shall not be a condition precedent or subsequent to the termination's effectiveness. In the event of such termination, and without limiting any other available remedies, the Awarding Authority may, at its option:

   (1) hold the Contractor and its sureties liable in damages for a breach of Contract;

   (2) notify the Contractor to discontinue all work, or any part thereof, and the Contractor shall discontinue all work, or any part thereof, as the Owner may designate;

   (3) complete the Work, or any part thereof, and charge the expense of completing the Work or part thereof, to the Contractor;

   (4) require the surety or sureties to complete the Work and perform all of the Contractor’s obligations under this Contract.

   If the Awarding Authority elects to complete all or any portion of the Work as specified in (3) above, it may take possession of all materials, equipment, tools, machinery, implements at or near the Site owned by the Contractor and finish the Work at the Contractor's expense by whatever means the Awarding Authority may deem expedient; and the Contractor shall cooperate at its expense in the orderly transfer of the same to a new contractor or to the Awarding Authority as directed by the Awarding Authority. In such case the Awarding Authority shall not make any further payments to the Contractor until the Work is completely finished. The Owner shall not be liable for any depreciation, loss or damage to said materials, machinery, implements or tools during said use and the Contractor shall be solely responsible for their removal from the Site after the Owner has no further use for them. Unless so removed within fifteen days after notice to the Contractor to do so, they may be sold at public auction, after publication of notice thereof at least twice in any newspaper published in the county where the Work is being performed, and the proceeds credited to the Contractor’s account; or they may, at the option of the Awarding Authority, be stored at the Contractor’s expense subject to a lien for the storage charges.

   **C.** Damages and expenses incurred under paragraph B above shall include, but not be limited to, costs for the Designer's extra services and OPM services required, in the opinion of the Awarding Authority, to successfully inspect and administer the construction contract through final completion of the Work.
D. Expenses charged under paragraph B above may be deducted and paid by the Awarding Authority out of any moneys then due or to become due the Contractor under this Contract.

E. All sums damages, and expenses incurred by the Owner to complete the Work shall be charged to the Contractor. In case the damages and expenses charged are less than the sum that would have been payable under this Contract if the same had been completed by the Contractor, the Contractor shall be entitled to receive the difference. In case such expenses shall exceed the said sum, the Contractor shall pay the amount of the excess to the Owner.

2. Termination For Convenience.
   A. The Awarding Authority may terminate this Contract for convenience even though the Contractor is not in default by giving notice to the Contractor specifying in said notice the date of termination.
   B. In case of such termination without cause, the Contractor shall be paid:
      (1) all sums due and owing under this Contract through the date of termination, including any retainage withheld to the date of termination, less any amount which the Awarding Authority determines is necessary to correct or complete the Work performed to the date of termination; plus
      (2) a reasonable sum to cover the expenses which Contractor would not have incurred but for the early termination of the Contract, such as demobilization of the work force, restocking charges, termination fees payable to Subcontractors.
   C. The payment provided in paragraph B above shall be considered to fully compensate the Contractor for all claims and expenses and those of any consultants, Subcontractors, and suppliers, directly or indirectly attributable to the termination, including any claims for lost profits.

3. Contractor's Duties upon Termination for Convenience.
   Upon termination of this Contract for convenience as provided in Section 2 of this Article, the Contractor shall: (1) stop the Work; (2) stop placing orders and Subcontracts in connection with this Contract; (3) cancel all existing orders and Subcontracts; (4) surrender the Site to the Awarding Authority in a safe condition; (5) transfer to the Awarding Authority all materials, supplies, work in process, appliances, facilities, equipment and machinery of this Contract, and all plans, Drawings, specifications and other information and documents used in connection with this Contract.

ARTICLE XVI: MISCELLANEOUS PROVISIONS

1. No Assignment by Contractor.
   The Contractor shall not assign by power of attorney or otherwise, or sublet or subcontract, the Work or any part thereof, without the previous written consent of the Awarding Authority and shall not, either legally or equitably, assign any of the moneys payable under this Contract, or Contractor's claims hereunder, unless with the like consent of the Awarding Authority, whether said assignment is made before, at the time of, or after the execution of the Contract. The Contractor shall remain responsible for satisfactory performance of all Work sublet or assigned. Consent of the Awarding Authority shall not be deemed to constitute a representation or waiver of any right hereunder by the Awarding Authority as to the qualifications or the responsibility of the Contractor or Subcontractor(s).

2. Non-Appropriation.
   If the Awarding Authority is unable to obtain an appropriation of funds sufficient to discharge its obligations under this Agreement for any fiscal year during the term of this Agreement, it shall not be obligated to make any further payments, and this Agreement may be terminated immediately by either the Awarding Authority or the Contractor, provided that the Awarding Authority shall make payment to the Contractor for obligations incurred during the period for which funding was included in an annual or supplemental appropriation.

3. Claims by Others Not Valid.
   No person other than the Contractor shall acquire any interest in this Contract or claim against the Awarding Authority or Owner hereunder, and no claim by any other person shall be valid except as provided in M.G.L. c. 30, s. 39F of the General Laws.
4. **No Personal Liability of Public Officials.**
No public official, employee, or agent of the Awarding Authority or Owner shall have any personal liability for the obligations of the Awarding Authority or Owner set forth in this Contract.

5. **Severability.**
The provisions of this Contract are severable, and if any of these provisions shall be held unconstitutional or unenforceable by any court of competent jurisdiction, the decision of such court shall not affect or impair any of the other provisions of this Contract.

6. **Choice of Laws.**
This Contract shall be governed by the laws of the Commonwealth of Massachusetts for all purposes, without regard to its laws on choice of law. All proceedings under this Contract or related to the Project shall be brought in the courts of the Commonwealth of Massachusetts.

7. **Standard Forms.** NOT APPLICABLE

8. **No Waiver of Subsequent Breach.**
No waiver of any breach or obligation of this Contract shall constitute a waiver of any other or subsequent breach or obligation.

9. **Remedies Cumulative.**
All remedies of the Awarding Authority provided in this Contract shall be construed as cumulative and may be exercised simultaneously or in any order as determined by the Awarding Authority in its sole discretion. The Awarding Authority shall also be entitled as of right to specific performance and equitable relief including the right to an injunction against any breach of any of the provisions of this Contract.

10. **Notices.**
Notices to the Contractor shall be deemed given when hand delivered to the Contractor's temporary field office at or near the Site, or when deposited in the U.S. mail addressed to the Contractor at the Contractor's address specified in the Owner - Contractor Agreement, or when delivered by courier to either location. Unless otherwise specified in writing by the Awarding Authority, notices and deliveries to the Awarding Authority shall be effective only when delivered to the Awarding Authority at the address specified in the Owner - Contractor Agreement and date-stamped at the reception desk or for which a receipt has been signed by the agent or employee designated by the Awarding Authority to receive official notices.

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**ARTICLE XVII: EQUAL EMPLOYMENT OPPORTUNITY, NON-DISCRIMINATION AND AFFIRMATIVE ACTION PROGRAM.**

This Contract includes the provisions of the Awarding Authority's "Equal Employment Opportunity, Non-Discrimination, and Affirmative Action Program" attached as Appendix A to these General Conditions of the Contract and incorporated herein by reference.

**ARTICLE XVIII: GOALS FOR PARTICIPATION BY MINORITY BUSINESS ENTERPRISES AND WOMEN BUSINESS ENTERPRISES**
This Contract includes the provisions of the Awarding Authority's program relating to Goals for Participation by Minority Business Enterprises and Women Business Enterprises attached as Appendix B to these General Conditions of the Contract and incorporated herein by reference.
INSTRUCTIONS TO BIDDERS
For
AFFIRMATIVE ACTION ISSUES
for Public Works and Construction Projects

Office of Equal Opportunity & Contract Compliance
133 William Street, Room 208
New Bedford, Massachusetts 02740
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Appendix A  Bid Submission Documents

Appendix A  Bid Submission Documents
**AA.01: Definitions**
*relevant to the requirements set forth in this bidding document*

**Construction Bidding Statutes**

*Public Works Projects*
Governed under Massachusetts General Laws, ch. 30, sec. 39M.
Includes all municipal contracts for construction, reconstruction, alteration, remodeling, or repair estimated to cost more than $5,000, which does not include work on a building. Includes the construction and repair of roads, bridges, water mains, sewers, and the like, as well as improvement to public land (i.e.: operation of a municipal landfill, removal of waste materials, grading, erosion control, and other forms of improvement and maintenance.

Also governs contracts of $5,000 - $25,000 for construction, reconstruction, installation, demolition, maintenance, or repair work on a building.

*Building Projects*
Governed under Massachusetts General Laws, Ch. 149, sec. 44.
Includes all contracts for the construction, reconstruction, installation, demolition, maintenance, or repair of a building at an estimated cost of more then $25,000.

**Lowest Eligible & Responsible Bidder**
Massachusetts G.L. c. 30, sec. 39M; c. 149, sec. 44A state that the contract be awarded to the lowest eligible and responsible bidder.

Eligible means the bidder meets all the requirement set forth in the bidding documents.

Responsible means the bidder possesses the skill, ability, and integrity to complete the job.

**Reasonable Accommodations**
Any change in work environment or the way job duties are customarily performed that enables individuals with disabilities to perform the essential functions of the job in issue, or that ensures equal opportunity for individuals with disabilities with respect to the application process or the enjoyment of benefits and privileges of employment.

**Administering Agency**
The agency that administers the state, state-assisted, or federally assisted contract awarded by the contracting agency

**Contracting Agency**
The agency that directly awards the contract

**Contractor**
Any general contractor and all subcontractors

*This information is taken directly from *Designing and Constructing Municipal Facilities: Legal Requirements; Recommended Practices; Sources of Assistance* published by, William Francis Galvin, Secretary of the Commonwealth, Office of the Inspector General, Oct. 1989.*
Minority / Women Business Enterprise
As defined by the Massachusetts State Office of Minority/Women Business Assistance (SOMWBA). In summary, an MBE/WBE is a business at least fifty-one percent (51%) owned or controlled by minority/women group members, or an individual contractor or professional who is a minority/women group member (as defined by SOMWBA).

Minority refers to:

Native American
A person having origin in any of the original people of North America, who is recognized as American Indian by a tribe or tribal organization or is recognized as such within his/her community

Asian
A person having origin in any of the original people of the Far East, Southeast Asia, Indian Subcontinent, Korea, Philippines, and Samoa

Black
A person having origin in any of the black racial groups of Africa

Cape Verdean
A person having origin in any of the original people of the Cape Verde Islands

Eskimo / Aleut
A person having origin in any of the original people of Northern Canada, Greenland, Alaska, and East Siberia

Hispanic
A person of Spanish descent and culture having origin in Mexico, the Island of the Caribbean, Central America or South America

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MINORITY/WOMAN BUSINESS ENTERPRISE PROGRAM

It is the policy of the government of the United State of America, the Commonwealth of Massachusetts and the City of New Bedford, that no person shall be discriminated against in any manner whatsoever, on the grounds of race, color, age, national origin, disability, religion, or sex.

Under this policy, the minority and woman business enterprises shall have the maximum practicable opportunity to participate in federally assisted projects, and shall not be excluded from such participation, nor denied the benefits of or be subjected to discrimination under any program or activity receiving federal assistance.

The City of New Bedford unequivocally ascribes to said policies as the recipient of Federal and State financial assistance, in connection with its activities, and may receive further Federal and State financial assistance in the future.

The City of New Bedford strongly affirms that it will not discriminate in any contractual procedure against any person because of race, color, age, national origin, disability, religion, or sex, or any other condition that is a bona fide qualification. This policy shall be administered at all levels with a positive, aggressive and supportive attitude by all department heads.

It is the responsibility of all department heads and employees to take affirmative steps to implement this policy to ensure equality of opportunity in conducting the affairs of the City of New Bedford, including notifying those persons and businesses doing business with the City of New Bedford, that contracts for goods and services and construction, shall be made without, reference to race, color, age, national origin, disability, religion, or sex.

This Minority/Woman Business Enterprise Program sets forth the administrative standards for further implementation of the City of New Bedford’s policy for the utilization of minority and female contractor, subcontractors, and suppliers.

Each department shall ensure that all solicitation in advertisements includes a statement of the City’s affirmative action policy, in an approved format.

The city’s Equal Opportunity shall be responsible for ensuring that all aspects of the MBE/WBE program are initiated and undertaken. By virtue of the delegation of this responsibility and authority to direct the program, the Contract Compliance Officer will report directly to the Mayor on equal opportunity matters. The Equal Opportunity Officer shall be responsible for the development, administration, and monitoring of all activities necessary to ensure the accomplishment and success of this program.

NOW, THEREFORE IT IS HEREBY RESOLVED that the following Minority/Woman Business Enterprise Program is instituted for and in behalf of the City of New Bedford.

[Signature]

Mayor, Jon Mitchell

[Date]

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AA.03: City of New Bedford Ordinances - Synopsis

See Appendix A for complete City Ordinances relevant to this bid document

(1) Residency Requirements for Certain City-Supported Construction Projects, Chap. 10, Article II.

(a) shall apply to all general and subcontractors of public works projects which have a projected cost of more than $100,000.00

(b) fifty (50) percent of the total employee man-hours in each trade must be performed by residents of the City of New Bedford (excluding the employer’s foreman or supervisor and two other key employees.)*

* Contact the N.B. EEO Dept. for further assistance in this matter.

(c) resident is defined as someone having his/her true, fixed, and permanent home and principal establishment in the City of New Bedford, for a minimum of six (6) months prior to the contract bid opening date.

(2) Contractor Qualifications and Sanctions, a.k.a. The Responsible Employer Plan, Chap. 10-77.

(a) shall apply to all bidders and subcontractors for projects subject to MGL c. 149

(b) not applicable to construction projects where the low general bid was less than $100,000; to subcontracts bid for less then $25,000; or to re-bids for which the City receives fewer than three (3) qualified bidders in the original bid

(c) must pay appropriate lawful prevailing wage rates to employees

(d) must maintain or participate in a bona fide apprentice training program for each apprenticeable trade represented in the workforce

(e) must furnish hospitalization and medical benefits and maintain appropriate accident insurance coverage

(f) must classify all employees as employees rather than independent contractors, and treat accordingly regarding workers compensation, unemployment taxes, social security taxes and income tax withholding

AA.04: Contractors Agreements under Executive Order 11246, as Amended by Executive Order 11375

During the performance of this contract, the contractor agrees as follows:

(1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment of compensation; and selection of training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this nondiscrimination clause.

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(2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex or national origin.

(3) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency contracting officer, advising the labor union or workers’ representative of the contractor’s commitments under Section 202 of Executive Order No. 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(4) The contractor will comply with all provisions of Executive Order No. 11246 of Sept. 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(5) The contractor will furnish all information and reports required by Executive Order No. 11246 of Sept. 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(6) In the event of the contractor’s noncompliance with the nondiscrimination clauses of this contract or with any of such rules, regulations or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 11246 of Sept. 24, 1965, or by rule, regulation or order of the Secretary of Labor, or as otherwise provided by law.

(7) The contractor will include the provisions of paragraphs (1) through (7) in every subcontract or purchase order, unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246 of Sept. 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as may be directed by the Secretary of Labor as a means of enforcing such provisions including sanctions for noncompliance: provided, however, that in the event the contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

AA.05: Dept. of Labor, 41 Code of Federal Regulations Parts 60-1, 60-6 - Government Contractors, Affirmative Action Requirements, Executive Order 11246

(1) Segregated Facilities. The contractor hereby certifies that it does not and will not maintain or provide any facilities for its employees in a segregated manner, or permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. Further, the contractor shall obtain a similar certification of nonsegregated facilities prior to the award of any contract or subcontract, which is subject to Executive Order 11246, and shall provide a copy thereof to the Association. This clause prohibits segregation on the basis of race, color, religion, national origin, or sex, and applies to all contracts regardless of the amount thereof. The term facilities includes, but is not limited to, waiting rooms, work areas, restaurants and other eating areas, time clock, parking lots, drinking fountains, recreation or entertainment areas, transportation, employer-provided housing, washrooms, locker rooms or other storage or dressing areas.

(2) Affirmative Action Compliance Program. The contractor certifies that it has developed a written affirmative action compliance program for each of its establishments consistent with the rules and regulations published by the Department of Labor in 41 CFR Chapter 60, and agrees to require a similar certification from each of its nonexempt subcontractors. Such an affirmative action program shall contain a set of specific and result-oriented procedures, the objective of which shall be the achievement of equal employment opportunity. An acceptable affirmative action program must include an analysis of areas within which the contractor is deficient in the utilization of minority groups and women and further, goals and timetables to which the contractor’s good faith efforts

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must be directed to correct any deficiencies and, thus, to achieve prompt and full utilization of minorities and women, at all levels and in all segments of his work force where deficiencies exist. The contractor’s affirmative action plan shall be summarized and updated annually and the program summary shall be submitted to the Office of Federal Contract Compliance Programs (OFCCP) on the anniversary date of the contractor’s affirmative action program.

(3) Contractor’s Compliance with Exec. Order and 41 CFR Par 60-4. The contractor’s compliance with E.O. 11246 and 41 C.F.R. Part 60-4, shall be based on its implementation of the Equal Opportunity clause, specific affirmative action obligations required by the specifications set forth in 41 C.F.R. 60-4.3, and its efforts to meet the goals established for the geographical area where the contract resulting from this solicitation is to be performed.

AA.06: Section 503 of the Rehabilitation Act of 1973

(Dept. of Labor, 41 Code of Federal Regulations, Parts 60-250 and 60-741, □Affirmative Action & Nondiscrimination Obligations of Contractors and Subcontractors Regarding Individuals with Disabilities, Disabled Veterans, and Veterans of Vietnam Era)

Parties holding a Government contract or subcontract in excess of $10,000 must take affirmative action to employ and advance in employment-qualified individuals with disabilities. Contractors are required to use effective practices to recruit qualified individuals with disabilities.

Applicants with disabilities must be provided a reasonable accommodation if they are qualified with respect to the application process (e.g.: if they present themselves at the correct location and time to fill out an application).

AA.07: MBE / WBE Policy (for the life of the project)

(1) Eleven (11) percent of the work on this project shall be performed by Minority Business Enterprises (MBEs) and five (5) percent of the work shall be performed by Women Business Enterprises (WBEs) for a total of 16% overall. Four (4%) percent of all Airport projects shall be performed by Disadvantaged Business Enterprises (DBE). Proven documentation of nonavailability of either one of these entities provides that the available businesses may be awarded no less than 16% of the total contract dollar value for most City projects and 4% of Airport projects.

(2) The Bidder must submit with the bid the necessary certification setting forth the bidder’s compliance with the MBE/WBE contractors or the DBE contractors when required. FAILURE TO SUBMIT THESE CERTIFICATIONS AT THE TIME OF THE BID MAY RESULT IN THE BID BEING CONSIDERED NONRESPONSIVE.

(3) If it is determined that one or more of the MBE/WBE or DBE contractors, as submitted by the Contractor on the EEO forms, is not SOMWBA certified or certified by the Local Government Unit, in accordance with the provision of Executive Order 237, the bidder shall have five (5) working days, following notification, to either find a certified MBE/WBE/DBE contractor to perform work equal to or greater than that of the uncertified contractor, or to submit a waiver request.

(4) The contractor shall not enter into any subcontract with any person or firm debarred from government contracts, pursuant to Executive Order 11246.
AA.08: Workforce Utilization (for the life of the project)

(1) Minimum percentages for employment (workforce utilization) on the project are at 18% minority and 6.9% female participation. The employment percentages shall apply to the contractor and to all subcontractors, regardless of tier, for all on-site work.

A single goal for minorities and a separate goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the contractor has achieved its goals for women generally, the contractor may be in violation of the Exec. Order if a specific minority group of women is under-utilized.)

(3) The contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

AA.09: Contractor’s EEO / Records Monitor

The contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof, as may be required by the Government, and to keep records which shall at least include, for each employee, the name, address, telephone numbers, social security number, race, sex, status, (e.g.: mechanic, apprentice, trainee, helper, or laborer) dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents.

AA.10: Bidder’s Eligibility

The lowest responsible and eligible bidder shall mean the General Bidder whose bid is the lowest of those bidders demonstrating possession of the skill, ability and integrity necessary for the faithful performance of the work, and
(a) who shall certify that he/she is able to furnish labor that can work in harmony with other labor employed on the work;
(b) who shall certify that he/she will comply with the minority workforce goal (18%) the woman workforce goal (6.9%) and, for projects $100,000+, NB residency goal of 50%; the insurance that all subcontractors and/or sub-subcontractors are also in compliance with workforce utilization goals; including compliance with the minority business goal (11%) and woman business goal (5%), for a total of 16% (or 4.0% for Airport projects) of the total dollar amount of the contract, and will certify that it will meet all applicable City Ordinances in accordance with this contract provision.

AA.11: Bid Submission Requirements

(1) Required bid forms that must be completed, signed, and submitted with the bid at the time of the bid opening, are as follows:
(a) Certificate of Understanding; Certification of Compliance w/ Exec. Order 11246
(b) Schedule of Participation for MBE/WBE or DBE as required
(c) Letter of Intent (for each MBE/WBE/DBE participation)
(d) MBE/WBE/DBE Contractor Identification Statement (for each MBE/WBE/DBE)
(e) Bidder’s Certification (to be completed by both the General Contractor and each MBE/WBE/DBE)
(f) If applicable, a completed and signed MBE/WBE/DBE Unavailability Certification in the event that the work listed on the Schedule is not sufficient to fulfill the requirement for MBE/WBE/DBE Participation. This certification must include a statement by the bidder of the reasons why it believes it is in compliance with this provision, and a list of the names, addresses, telephone numbers and reason given for unavailability of the Minority/Women Contractor contacted by the bidder with respect to the performance of work under the contract.

(2) The successful bidder will also be required to submit, prior to award, its estimates of labor (permanent and trainee) and material required to carry out its work under the contract, for review by the City, so as to establish maximum feasible goals for the utilization of City residents and business concerns. These goals, and the basis for monitoring and reporting progress toward meeting them, will be established by mutual agreement, with the assistance of the City’s Contract Compliance Officer, and discussed in the Pre-Construction or Pre-Award Conference.

AA.12: Bid Approval or Disapproval

(1) Failure to submit any of the required MBE/WBE/DBE forms and percentages at the time of the bid, will have the Bid/Proposal eliminated. Failure to meet the required percentages, or to fully complete any of the submitted paperwork, at the time of the bid opening, the bidder will have five (5) days, from the date of the bid opening, to comply with the requirements. Failure to meet these requirements within the five days will have the Bid/Proposal disapproved by the Office of Equal Opportunity.

(2) Each bidder, as part of its bid submission, must agree to contract with minority and woman owned businesses, as defined by the State Office of Minority and Woman Business Assistance (SOMWBA) and the City of New Bedford’s affirmative action policies. The amount of participation reserved for such enterprises shall not be less than 16% of the total bid amount, of which at least 11% of the total bid amount applies to minority businesses. The balance 5% is applied to women-owned businesses. Proven documentation of nonavailability of either one of these entities provides that the available business may be awarded no less than 16% of the total contract dollar value.

(3) If the general bidder is either an MBE or WBE and is responsible for 100% of the project work, the 16% is fulfilled. If said MBE/WBE contractor is a joint venture, the MBE/WBE must be responsible for at least 51% of the project.

(4) The general contractor must submit, as part of its bid and as a condition of contract approval, signed Letters of Intent with all subcontractors and material suppliers listed on the participation schedule. Sub-bidders must submit the participation schedule with their bid and a participation schedule if they intend to sub-sub work.

AA.13: Steps to Ensure a Responsive Bid

The total price for work to be performed by Minority/Woman or Disadvantaged Contractors, as indicated in each bidder’s bid submission, is required to be sufficient to fulfill the MBE/WBE/DBE requirements, unless the bidder shall demonstrate to the satisfaction of the Awarding Authority that:

(1) it has made every possible effort to contact and negotiate with Minority/Women or Disadvantaged Contractors in an attempt to subcontract work, including every possible effort to select the portions of the work proposed to be subcontracted in order to meet the requirements;

(2) it was unable, notwithstanding such efforts, to achieve the stated requirement because Minority/Woman or Disadvantaged Contractors were not qualified or were unavailable.

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(any proven nonavailability of MBE/WBE/DBE must make up the difference to still fulfill the 16% goals with the available MBE or WBE or 4.0% DBE. If neither category is available to fulfill the goal, it must have a SOMWBA statement as to no business listed);

(3) it included in its Schedule of Participation such proposed agreements as could be made with such efforts;

(4) the general contractor is an MBE or WBE and said contractor is performing 16% of work or the general contractor is a DBE and is performing 4.0% of the work and therefore, will be deemed as fulfilling the affirmative action bidding requirements;

(5) for contractors under $50,000, that can demonstrate all work will be completed under the contractor’s own workforce, the contractor must be able to demonstrate how this will be accomplished and submit, at the time of the bid a statement requesting a waiver of the 16% MBE/WBE or 4.0% DBE participation goal. Employment percentages must still be met.

AA.14: Bid Award or Rejection

(1) The Awarding Authority will responsible for awarding or rejecting any bid, with the approval/disapproval of the Office of Equal Opportunity & Contract Compliance in its decision. The Awarding Authority also reserves the right to reject any or all bids, or to accept any other than the lowest bidder, should it be deemed to be in the best interest of the City of New Bedford, Massachusetts, to do so.

(2) The Awarding Authority shall reject, as non-responsive, any bid, which it determines, fails to comply with the applicable requirements of this contract provision. Nothing, herein, shall relieve any bidder or any contractor performing any work under the contract, from any of the terms, conditions, or requirements of the contract.

AA.15: Awarded Contractor’s Obligations

(1) The Contractor shall specifically ensure that the company’s EEO policy and affirmative action obligations under this contract provision, is reviewed with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decision, including specific review of these terms with on-site supervisory personnel, prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

(2) Minority/Woman Work Hours must be maintained for the life of this project (at a minimum ratio of 18% minority work hours and 6.9% woman work hours to total work hours in each job category, including, but not limited to bricklayers, carpenters, cement masons, electricians, ironworkers, operating engineers, and those classes of work identified in Section 44C of M.G.L. ch. 149). (Please note the City of New Bedford’s Residency Ordinance requiring 50% City of New Bedford residents on projects of $100,000+)

(3) Apprentices and Trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability, in order for the apprentices and trainees to be counted toward the minority/woman work hour percentage goals.

(4) Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the contractor has a collective bargaining agreement to refer either minorities or women, shall excuse the contractor’s obligation under these specifications, Exec. Order 11246, or the regulations promulgated pursuant thereto.

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(5) In the employment of journeymen, apprentices, teamsters and laborers, the Contractor shall give preference first, to citizens of the Commonwealth who have served in the armed forces of the United States in time of war and have been honorably discharged therefrom or released from active duty therein, and who are qualified to perform the work which the employment relates, and secondly, to citizens of the City of New Bedford, and if such cannot be obtained in sufficient numbers, the Commonwealth generally, then to citizens of the United States.

(6) Reports to Be Submitted to the Office of Equal Opportunity & Contract Compliance include:

(a) Licensing Statutes: Every contractor and subcontractor must submit, before starting work, a plan by which he/she will satisfy the requirements of licensing statutes, including the following, where applicable: MGL Ch. 149, Sec. 6 (painters); Ch. 146, Sec. 53 (hoisting engineers); Ch. 149, Sections 6B-6F (asbestos abatement workers, supervisors & contractors); Ch. 146, Sec. 3 & 3B (plumbers & gas fitters); Ch. 141, Sec. 1 (electricians); Ch. 14, Sec. 84 (pipefitters & sprinkler fitters); and Ch. 143, Sec. 94 (construction supervisor).

(b) Work Hour Reports: The contractor and each subcontractor shall prepare weekly reports in an approved form, of the hours worked in each trade by each employee, identified as minority or non-minority, and/or female, and/or resident. Copies of these shall be provided at the end of each such week to the City’s Office of Equal Opportunity & Contract Compliance.

(c) Projected Manning Tables: The contractor shall prepare projected manning tables on a quarterly basis. These shall be broken down into projections, by week, of workers required in each trade. Copies shall be furnished one week in advance of the commencement of the period covered, and also when updated, to the City. A copy of the certified payroll will be submitted with these reports.

(d) Billing Reports: The contractor shall prepare and submit monthly billing reports of amounts paid to MBEs, WBEs and/or DBEs each monthly billing period, as well as the record of final payment accompanied by canceled checks.

(e) Payroll Reports: Every contractor and subcontractor shall submit weekly payroll reports to the City, indicating the following information for each employee and/or independent contractor employed on the project; name, address, hours worked, occupational classification, wages, and fringe benefit payments, if any. Said reports shall be signed by the employer or his authorized agent under the penalties of perjury (see MGL Ch. 149, Section 27B).

AA.16 Recruitment/Referral Responsibilities

(1) In the hiring of minority/woman journeymen, apprentices, teamsters, and laborers, the contractor shall rely on referrals from a multi-employer affirmative action program approved by the City, traditional referral method utilized by the construction industry, and referrals from agencies, not more than three in number at any one time, designated by the City’s Equal Opportunity Officer.

(2) Records of employment referral orders, prepared by the contractor, shall be made available to the awarding authority.

(3) The contractor will maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source, or community organization, and of what action was taken with respect to each such individual.

(4) If such individual was sent to the union hiring hall for referral, and was not referred back to the contractor, this shall be documented in the file with the reason therefore, along with whatever

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additional actions the contractor may have taken.

(5) The contractor will document and maintain a record of all solicitations of offers for subcontractors from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractors associations and groups.

(6) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex or national origin, and maintain a record thereof.

AA.17: Subcontracts

(1) The Contractor receiving the award of the contract shall be required to obtain from each of its subcontractors (filed or non-filed) and submit to the Authority prior to the performance of any work under said subcontract, a certification by said subcontractor, regardless of tier, that it will comply with the minority and women work hours/employee ratio and specific affirmative action steps, and to submit this information to the Office of Equal Opportunity, prior to the subcontractor’s performance on the project.

(2) In order to ensure that the said subcontractor’s certification becomes a part of all subcontracts under the prime contract, no subcontract shall be executed until an authorized representative of the Authority administering this project has determined, in writing, that the said certification has been incorporated in such subcontract, regardless of tier. Any subcontract executed without such written approval shall be void.

(3) Whenever the contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of $10,000, the contract provisions listed in this Instructions to Bidders for Affirmative Action Issues, and the applicable goals for minority and female participation and which is set forth in the solicitation form which the contract resulted.

(4) Noncompliance of a subcontractor in compliance with these provisions, will result in the contractor taking such action, with respect to any subcontract or purchase order, as the administering agency may direct, as a means of enforcing such equal opportunity provisions; provided that, in the event a contractor becomes involved in, or is threatened with litigation with a subcontractor or vendor, as a result of such direction, the contractor may request the United States, the State of Massachusetts or the City of New Bedford, to enter into such litigation to protect the interests of the U.S., the State or the City.

AA.18: Wage Rates

(1) Attention is called to Labor Standards provisions regarding conditions of employment, including State and Federal Wage Rates, the Davis-Bacon Act, the Copeland Anti-Kickback Act, and the Contract Work Hours and Safety Standards Act. Where Federal and State wage rates differ, the higher rates shall be used as a minimum.

(2) The rate per hour of the wages to be paid to mechanics, apprentices, teamsters, chauffeurs, and laborers employed on the work shall be not less than the rate of wages in Minimum Wage Rates as determined by the Commissioner of Labor and Industries, as required by M.G.L. Chapter 149, Sections 26 & 27-27h. This schedule shall be in place for said employees during the life of this contract.

(3) Contractor shall keep posted on the site, a legible copy of said schedule. Keep on file wage rates and classifications of labor employed on this work, in order that they may be available for inspection by the Administrator, the Office of Equal Opportunity, or the Architect.

(4) 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.

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(5) Pay reserve police officers employed on this work the prevailing rate of wages paid to regular police officers, as required by M.G.L. Chap. 149, Sec. 34B, as amended. Such police officers shall be covered by Workmen’s Compensation Insurance and Employer’s Liability Insurance by the Contractor.

(6) Noncompliance by the contractor or any subcontractor will result in the City’s Contract Compliance Office and/or Legal Office, to consult with the Department of Labor and Industries, and will result in the contractor or subcontractor receiving notification of such, and subsequently must respond to the City of New Bedford within five (5) business days.

AA.19: Access to Compliance Information & Reports

(1) The contractor will provide all information and reports, required by the administering agency or the City of instructions issued by either of them, and will permit access to its facilities and any books, records, accounts, and other sources of information pertinent to the City’s affirmative action contract requirements.

(2) Where the information required is in the exclusive possession of another who fails or refuses to furnish this information, the contractor shall so certify to the administering agency or the City, and shall set forth what efforts he/she has made to obtain the information.

AA.20: Noncompliance

(1) Investigation
Whenever the administering agency or the City believe the general contractor or any subcontract may not be operating in compliance with the terms of this provision, the City directly or through it designated agent, shall conduct an appropriate investigation, and may confer with the parties, to determine if such contractor is operating in compliance with the terms of this contract provision. If noncompliance is found, then a preliminary report on noncompliance will be made, and the City or its agent will notify such contractor, in writing, of such steps as will, in the judgment of the city or its agent, bring such contractor into compliance.

(2) Report of Noncompliance
In the event that such contractor fails or refuses to fully perform such affirmative action steps, the City shall make a final report of non-compliance, and recommend to the administering agency, the imposition of one or more of the sanctions identified in these provisions. Within fourteen (14) days of the receipt of the recommendations of the City, the administering agency shall move to impose one or more of the following sanctions as it may deem appropriate to attain full and effective enforcement.

(3) Any disagreement between the City and a contractor or subcontractor shall be submitted for a hearing pursuant to the provisions of Chapter 30A. The City shall impose one or more of the following sanctions, as it may deem appropriate, to attain full and effective enforcement.

AA.21: Sanctions

(1) The recovery by the administering agency from the general contractor of 1/100 of 1% of the contract award price, or $1,000.00, whichever sum is greater, in the nature of liquidated damages, or if a subcontractor is in non-compliance, the recovery by the administering agency from the general contractor, a back charge against the subcontractor, of 1/10 of 1% of the subcontract price or $400.00, whichever sum is greater, in the nature of liquidated damages, for each week that such party fails or refuses to comply.

(2) The suspension of any payment or part thereof, due under the contract, until such as the general contractor or any subcontractor is able to demonstrate his/her compliance with the terms of the preceding sections of the contract.

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(3) The termination of employment of the contractor and taking possession of the site and finishing the work by whatever method he/she may deem expedient, upon giving the contractor and his/her surety, if any, seven days’ written notice.

(4) The termination or cancellation of the contract, in whole or in part.

(5) The denial to the general contractor and any subcontractor of the right to participate in any future contract awarded by the administering agency for a period of up to three years.

(6) Other sanctions to be applied, as stipulated in the City of New Bedford Ordinances (Residency and Responsible Employer Plan ordinances) and other local, state, and federal laws and regulations, as applicable.

AA.22: Appeal of Sanctions

If, at any time after imposition of one or more of the sanctions listed in these provisions, the contractor or subcontractor is able to demonstrate that it is in compliance with the EEO/AA program, the contractor or subcontractor may request the administering or contracting agency, in consultation with the City’s Office of Equal Opportunity, to conditionally suspend the sanction, pending final determination by the investigating officer, whether the contractor is in compliance. Upon final determination by the investigating office, the administering or contracting agency, based on the investigating officer’s recommendation, shall either lift the sanctions or impose them.

Sanctions shall not be imposed by the contracting agency or administering agency except after an adjudicatory proceeding, as defined by M.G.L. Chapter 30A, has been conducted. No investigation by the Office of Equal Opportunity shall be initiated without prior notice to the contractor or the subcontractor.

AA.23: Severability

The provisions of this section are severable, and if any of these provisions shall be held unconstitutional by any court of competent jurisdiction, the decision of such court shall not affect or impair any of the remaining provisions.
Bid Submission Checklist

THE GENERAL BIDDER SHALL SUBMIT ALL THE FOLLOWING FORMS AS A PART OF ITS BID SUBMISSION, AND SHALL SUBMIT A COPY OF SUCH TO:

The City of New Bedford
Office of Equal Opportunity
133 William Street Room 208
New Bedford, MA 02740
ph: 979-1446 / fax: 508-991-6148

(1) Certificate of Understanding: Certification of Compliance with Executive Order 11246"

(2) Schedule of Participation for Minority, Woman & Disadvantaged Business Enterprises

(3) Letter of Intent - for each MBE/WBE/DBE Participation

(4) MBE/WBE Contractor Identification Statement - for each MBE/WBE/DBE

(5) Bidder’s Certification - must be completed and signed by the General Contractor and all Subcontractors who will work on the project (to include MBE/WBE/DBE and non-MBE/WBE/DBEs)

(6) If applicable, a completed and signed MBE/WBE/DBE Unavailability Certification in the event that the work listed on the Schedule is not sufficient to fulfill the Requirement for MBE/WBE/DBE Participation. This certification must include a statement by the bidder of the reasons why it believes it is in compliance with this Provision, and a list of the names, addresses, telephone numbers and reason given for unavailability of the Minority/Woman/Disadvantaged Contractor who was contacted by the Bidder with respect to the performance of work under the contract.

NOTE: FAILURE TO FULLY COMPLETE AND/OR TO SUBMIT ANY OF THE ABOVE-REFERENCED DOCUMENTS AT THE TIME OF THE BID SUBMISSION MAY RESULT IN THE BID BEING CONSIDERED DISAPPROVED.

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Commonwealth of Massachusetts

BIDDERS CERTIFICATE OF UNDERSTANDING


Contractor ___________________________________________ Project _________________________

Address ___________________________________________ Tel. # _____________________ Project # ______

________________________________________________ Fax # ___ ______________________

I, the undersigned, understand that:

A. Minority Business Enterprises are to be awarded at least 11% of the total contract amount for construction/public works projects.
B. Woman Business Enterprises are to be awarded at least 5% of the total contract amount for construction/public works projects.
C. Disadvantaged Business Enterprises are to be awarded at least 4% of the total contract amount for airport projects.
D. All required MBE/WBE/DBE forms included in Instructions to Bidders are to be completed and submitted with the bid.
E. Prior to award of the contract, a pre-construction conference must be held (to be attended by the general contractor and all subcontractors, regardless of tier) at which time the following requirements will be discussed:
   1. Weekly Workforce Utilization Reports (Form CAD85) are to be submitted weekly with payroll reports within five (5) days of last payroll;
   2. Quarterly Manpower Projection Tables (Form CAD85-1) are to be submitted with the Start of Construction notification;
   3. Any project in the amount of $100,000+ is subject to the New Bedford Resident Hiring and the Responsible Employer Plan ordinances;
   4. A minimum goal of 18% minority manpower utilization, in terms of total work hours in the aggregate workforce, in each trade or craft, on each project, will be maintained. The goal for female manpower utilization will be maintained at 6.9% according to regulations;
   5. Minority and female work hours are to be uniform in each trade, and minorities and females are to be employed evenly on each project;
   6. Minority or female employees are not be transferred from project to project for the purpose of meeting goals;
   7. A roster of all minority and/or female applicants for employment must be maintained at each project site (Federal & Non-Federal) in the New Bedford Hometown Plan Area.
E. The submission of the above reports and adherence to hiring practices and equal opportunity performance of subcontractors is the responsibility of the prime contractor.

The bidder hereby certifies that he/she shall comply with the minority manpower ratio and specific affirmative action steps contained in the EEO above, including compliance with the minority contractor compliance specifications. The Contractor receiving the award of the contract shall be required to obtain from each of its subcontractors, and submit to the contracting or administering agency prior to the performance of any work under said contract, a certification by said sub-contractor, regardless of tier, that it will comply with the minority manpower ratio and specific affirmative action steps contained in this appendix.

____________________________________________________________  ___________ ______________________
Authorized Signature                                           Date

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SCHEDULE OF PARTICIPATION
DISADVANTAGED/MINORITY / WOMAN BUSINESS ENTERPRISES
_to be completed by the Bidder_

**Item I - Minority Or Disadvantaged Business Enterprise Participation**

1. Name: ________________________________
   Address: ________________________________
   Nature of Participation: ________________________________
   Dollar Value / % of Bid: ________________________________

2. Name: ________________________________
   Address: ________________________________
   Nature of Participation: ________________________________
   Dollar Value / % of Bid: ________________________________

<table>
<thead>
<tr>
<th>TOTAL BID PRICE</th>
<th>TOTAL DBE or MBE COMMITMENT</th>
</tr>
</thead>
</table>
| $________________| $__________________________| %

**Item II – Woman Or Disadvantaged Business Enterprise Participation**

1. Name: ________________________________
   Address: ________________________________
   Nature of Participation: ________________________________
   Dollar Value / % of Bid: ________________________________

2. Name: ________________________________
   Address: ________________________________
   Nature of Participation: ________________________________
   Dollar Value / % of Bid: ________________________________

<table>
<thead>
<tr>
<th>TOTAL BID PRICE</th>
<th>TOTAL WBE or DBE COMMITMENT</th>
</tr>
</thead>
</table>
| $________________| $__________________________| %

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The bidder agrees to furnish implementation reports, as required by the awarding authority, to indicate the MBE/WBE or DBE which it has used or intends to use. Breach of this commitment constitutes a breach of the contract.

General Bidder: _________________________________________________________________

Signature: ______________________________________________________________________ Date: ______________________

LETTER OF INTENT

_to be completed by the DBE/MBE/WBE_

This form is to be completed by the DBE or MBE and WBE and must be submitted by the General Bidder as part of the Bid Proposal. A separate form must be completed for each MBE, WBE or DBE involved in the project.

Project Title: ________________________________________________________________

Project Location: _____________________________________________________________

To: __________________________________________________________ (Name of Bidder)

From: __________________________________________________________ (Name of DBE/MBE/WBE) Indicate DBE/MBE/WBE status

I / we intend to perform work in connection with the above project as (Check One)

{   } an individual {   } a partnership
{   } a corporation {   } a joint venture with: _____________________________
{   } other (explain): ___________________________________________________________________

It is understood that if you are awarded the contract, you intend to enter into an agreement to perform the activity described below for the prices indicated.

DBE/MBE/WBE PARTICIPATION:

<table>
<thead>
<tr>
<th>Description of Activity</th>
<th>Project Start Date</th>
<th>$ Amount</th>
<th>% of Bid Price</th>
</tr>
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<tbody>
<tr>
<td>______________________</td>
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</tbody>
</table>

The undersigned certify that they will enter into a formal agreement upon execution of the contract for the above-referenced project

 Revised 2007
. BIDDER

Authorized Signature Date

Address

Address

Authorized Signature Date

Address

Authorized Signature Date

Telephone / Fax

Telephone / Fax
MINORITY / WOMAN BUSINESS ENTERPRISE PROGRAM

CONTRACTOR IDENTIFICATION STATEMENT

Project Name: ___________________________________________________ Project#: ________________

Total Bid Price: $__________________________ Bid Date: ________________

In accordance with the New Bedford Minority Business Enterprise Program, the undersigned bidder certifies that he/she:

1. is a bona fide Minority/Woman/Disadvantaged Business Enterprise currently certified by the State Office of Minority/Woman Business Assistance (SOMWBA); and such SOMWBA certification has not changed; and in the event of said status changing, it will immediately forward written notification to the City of New Bedford and SOMWBA; and

2. intends to perform certain work (specified by formal bid proposal) under a contract in connection with the above-named project, and that work will not be sublet to any company at any tier; and

3. will comply with the minority/woman workforce ratio and specific affirmative action steps contained in the EEO/AA Contract Provisions and shall obtain from each of its subcontractors a copy of the bidder’s certification and submit to the administering agency, prior to the award of such subcontract, regardless of tier, that he/she will comply with the minority/woman workforce ratio and specific affirmative action steps contained in these and the EEO/AA Contract Provisions.

SOMWBA CERTIFICATION CATEGORY: ____________________________________________________

CONTRACTORS NAME: ___________________________________________________________________
{   } MBE   {   } WBE   {   } DBE

ADDRESS: ____________________________________________________________________________
_________________________________________________________________________________

TELEPHONE #: ___________________________ FAX #: ___________________________

REPRESENTATIVE NAME & TITLE: _______________________________________________________

AUTHORIZED SIGNATURE: ____________________________________________

GENERAL BIDDERS NAME: __________________________________________________________________

Revised 2007
BIDDERS CERTIFICATION

to be completed by General Contractor & each of its Subcontractors (MBE/WBE/DBE and non-MBE/WBE/DBE)

The undersigned bidder hereby certifies that he/she will comply with the Minority/Woman Workforce Ratio and Specific Affirmative Action Steps contained in the EEO/AA Provisions of this contract, including compliance with the Minority/Woman/Disadvantaged Business Enterprise as required under these contract provisions.

The contractor receiving the award of the contract shall be required to obtain, from each of its subcontractors, regardless of tier, a copy of this Bidder’s Certification indicating that it will comply with the Minority/Woman Workforce Ratio and Specific Affirmative Action Steps contained in these EEO/AA Contract Provisions, and submit it to the contracting agency prior to the award of such contract and subcontract.

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<td>{ } MBE { } WBE { }DBE { } Non-MBE/WBE</td>
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Revised 2007
MINORITY / WOMAN BUSINESS ENTERPRISES
UNAVAILABILITY CERTIFICATIONS

To be completed by General Contractor

(the Bidder shall prepare additional copies of this information form in the quantity necessary to comply with the bidding requirements)

I, _____________________________________________________, _____________________________

Name
Title

of __________________________________________________________________________________

Contractor Name
certify that on ____________________________________, I contacted the below listed MBE/WBE/DBE

Date of Contact
requesting a bid for

Project __________________________________________ as an {    } MBE, {    } WBE or {    } DBE for the provision of

{    } Goods & Services or {    } Labor to accomplish _________________________________________

Subcontract Work Offered to this MBE/WBE/DBE Company

________________________________________________________________________________

Name of Prospective Sub-Contractor

______________________________________________________________________________

Address                City and State                Telephone #

Contact was made by {    } Telephone {    } In Person

Said sub-contractor was unavailable for work on this project or unable to prepare a bid for the following reason(s): (check appropriate answer):

{    } MBE/WBE/DBE Firm Declined Job

{    } MBE/WBE/DBE Firm offered to do a job at the price of $___________________________, which was not acceptable because: ______________________________________________________

{    } Other _____________________________________________________________________

The above information is accurate and complete, to the best of my knowledge and belief. Signed under the pains and penalties of perjury.

____________________________________________________________________________________

Signature of Authorized Representative, General Contractor

Date

Revised 2007
MINORITY / WOMAN/DISADVANTAGED BUSINESS ENTERPRISES

REQUEST FOR WAIVER

Upon exhausting all known sources and making every possible effort to meet the minimum requirements for MBE/WBE/DBE participation, the Contractor may seek relief from these requirements by filing this form (completed) NO LATER THAN FIVE (5) working days following the bid opening. Failure to comply with this process shall be cause the bidder to be rejected, thereby rendering the contractor not eligible for award of the contract.

General Information

Project Title: __________________________________________ Location: __________________________

Bid Opening (time/date): __________________________ Location: __________________________

Bidder: __________________________________________________________________________

Mailing Address: ____________________________________________________________________________

Contact Person: __________________________________________________________________________

Telephone No.: (            ) ____________________________________________________________________________ Ext.

Minimum Requirements

The contractor must show that good faith efforts were undertaken to comply with the percentage goals, as specified. The bidder seeking relief must show that such efforts were taken appropriately, in advance of the time set for opening bid proposals, to allow adequate time for response(s) by submitting the following: (please check all that apply and attach applicable documentation)

A. A detailed record of the effort made to contact and negotiate with minority, woman or disadvantaged business enterprises, to include:
   ( ) 1. Names, addresses and telephone numbers of all such companies contacted;
   ( ) 2. Copies of written notice(s) which were sent to MBE/WBE/DBE potential subcontractors prior to bid opening;
   ( ) 3. Copies of advertisements prior to bid opening, as appearing in general publications, trade-oriented publications, and applicable minority/women focused media detailing the opportunities for participation;
4. A detailed statement as to why each subcontractor contacted (a) was not willing or (b) was not qualified to perform the work as solicited; and

5. In the case(s) where a negotiated price could not be reached, the bidder should detail what efforts were made to reach an agreement on a competitive price

6. Contractor certifies that 100% of the project is to be carried out with his/her own workforce.

B. The Agency may require the contractor to produce such additional information, as it deems appropriate and may obtain whatever other information it deems necessary to reach a conclusion from any source.

C. No later than fifteen (15) days after receipt of all necessary information and documentation, a decision will be made in writing to the bidder. If the waiver request is denied, the facts upon which a denial is based will be set forth. A contractor who is dissatisfied with the decision may then appeal that decision to the Equal Opportunity Employment Agency.

Certification

The undersigned herewith certified that the above information and appropriate attachments are true and accurate to the best of my ability, and that I have been authorized to act on behalf of the bidder in this matter.

___________________________________________________ ________________________
(authorized original signature) Date

Submit to: Equal Employment Opportunity
            Compliance Officer
            133 William Street, Room 208
            New Bedford, MA 02740

To be completed by the City of New Bedford’s EEO

__________________________  ______________________
Bid Date                  Initials
INTRODUCTION to WAGE RATE DETERMINATION SCHEDULE

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.2 THE MASSACHUSETTS PREVAILING WAGE LAW (MGL. c149, §§26-27H) - AN IMPORTANT GUIDE FOR CONTRACTORS DOING PUBLIC WORKS PROJECTS IN MASSACHUSETTS

A. Prevailing Wage Schedules
   1. Every contractor should obtain a schedule of prevailing wage rates for every public works project from the Awarding Authority (city, town, county, district, state agency or authority). It is the Awarding Authority’s responsibility to ensure that a copy of the wage schedule is provided to all contractors from whom estimates or bids are solicited for all projects. The Commonwealth of Massachusetts Division of Occupational Safety (DOS), Department of Labor and Workforce Development will not issue wage schedules directly to contractors or employees.
   2. Once a wage schedule has been issued for a project by DOS, it will remain in effect for the entire project. Appeals of wage determinations or classifications of employment may be made to the DOS Commissioner.
   3. A copy of the wage schedule is required to be posted at the work site.
   4. A wage schedule issued for a project may not be used on any other project. If, by chance, an Awarding Authority fails to provide you with a wage schedule to use when figuring your bid, do not use one you may have from another project. In this case, you should contact DOS immediately and urge the Awarding Authority to contact DOS to correct the oversight.
   5. The failure of an Awarding Authority to provide a wage schedule does not excuse a contractor from paying the prevailing rate.
   6. A copy of current Prevailing Wage Rates including Minimum Wage Rates for Apprentices; Notice regarding Massachusetts Prevailing Wage Law; Weekly Payroll Records Report and Statement of Compliance; and Weekly Payroll Report Form immediately follows this section.

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

C. Paying Employees
1. Prevailing wages must be paid to all employees on public works projects regardless of whether they are employed by the general contractor, a filed sub-bidder or any subcontractor. The prevailing wage applies equally to unionized and non-unionized workers.
2. All employees who perform work on a public works project must be paid hourly according to the wage schedule issued for the particular project.
3. The wage schedule issued for each project is in effect for the duration of that project. All wage increases listed on the schedule must be paid on the specified dates.
4. Employers are limited in the deductions that can be made from the hourly rate (represented as the “total rate” on the wage schedules). Only contributions to the following plans may be deducted:
   • Health and Welfare
   • Pension
   • Supplementary Unemployment
5. All contributions must be made to bona fide plans.
6. If an employer contributes to any, or all, of the above plans, it may deduct the hourly amount contributed from the “total rate.” If the employer does not contribute to any of the benefit plans listed above, then the employee’s hourly rate of pay will be the “total rate” from the wage schedule.
7. All other deductions, including but not limited to the following, may not be subtracted from the employee’s hourly prevailing wage rate:
   • Vacation Time
   • Sick Time
   • Training Funds
   • Charitable Contributions
   • Worker’s Compensation
   • Unemployment Insurance
   • Uniforms
8. Overtime, which must be paid to all employees who work more than 40 hours per week, shall be at least time-and-one-half the base rate (“total rate” less benefits, if any).
9. Any “separate check” given to an employee as the “benefit portion” of the prevailing wage may not be treated differently than the check for “base wages.” All “separate checks” are considered wages and subject to state and federal taxes, unemployment insurance and worker’s compensation requirements.

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

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

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

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

G. Wage schedules are issued by:

Massachusetts Department of Labor and Workforce Development
Division of Occupational Safety
399 Washington Street, 5th Floor
Boston, Massachusetts 02108
Telephone 617-727-3492; Fax 617-727-0726

H. Enforcement is carried out by:

Office of the Attorney General
Fair Labor and Business Practices
100 Cambridge Street
Boston, Massachusetts 02108
Telephone 617-727-3465

1.3 WAGE RATES

A. Classifications and wage rates as established by the Commonwealth of Massachusetts Division of Occupational Safety (DOS), Department of Labor and Workforce Development under the provisions of MGL Chapter 149, Section 26 immediately follows this Document.
1. The rate per hour of the wages to be paid to mechanics, apprentices, teamsters, chauffeurs, and laborers employed on the work shall not be less than the rate of wages included under “Minimum Wage Rates”.
2. The Contractor shall keep posted on the site a legible copy of said schedule. The Contractor shall also keep on file the wage rates and classifications of labor employed on this work in order that they may be available for inspection by the Awarding Authority, Administrator, or the Architect.

3. 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 Contract shall insert the rates of all those employed on the work.

4. The Contractor shall pay to any reserve police officers employed on the work the prevailing rate of wages paid to regular police officers as required by MGL Chapter 149 Section 34b, as amended. Such police officers shall be covered by Workmen's Compensation Insurance and Employer's Liability Insurance by the Contractor.

1.4 NOTICE TO AWARDING AUTHORITIES AND TO CONTRACTORS

Notice to Awarding Authorities
The Massachusetts Prevailing Wage Law
M.G.L. c. 149, §§26-27

NOTICE TO AWARDING AUTHORITIES

- The enclosed wage schedule applies only to the specific project listed at the top of the schedule, and these rates will remain in effect for the duration of the project, except in the case of multiyear projects. For projects lasting longer than one year, awarding authorities must request updated rates.

- You should request an updated wage schedule from the Department of Labor Standards if you have not opened bids or selected a contractor within 90 days of the date of issuance of the enclosed wage schedule.

- The wage schedule shall be incorporated in any advertisement or call for bids for the project for which it has been issued.

- Once a contractor has been selected by the awarding authority, the wage schedule shall be made a part of the contract for that project.
NOTICE TO CONTRACTORS

· The enclosed wage schedule must be posted in a conspicuous place at the work site during the life of the project.

· The wages listed on the enclosed wage schedule must be paid to employees on public works projects regardless of whether they are employed by the prime contractor, a filed sub-bidder, or any sub-contractor.

· The enclosed wage schedule applies to all phases of the project, including the final clean-up. Contractors whose only role is to perform final clean-up must pay their employees according to this wage schedule.

· All apprentices must be registered with the Massachusetts Division of Apprenticeship Training (DAT) in order to be paid at the lower apprentice rates. All apprentices must keep his/her apprentice identification card on his/her person during all work hours. If a worker is not registered with DAT, they must be paid the "total rate" listed on the wage schedule regardless of experience or skill level. For further information, please call 617-626-5409, or write to: DAT, 19 Staniford Street, 1ST Floor, P.O. Box 146759, Boston, MA 02114.

PART 2 – PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF DOCUMENT
Executive Office of Labor and Workforce Development
Department of Labor Standards

Prevailing Wage Rates

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

Awarding Authority: City of New Bedford

Contract Number: 20192005

City/Town: NEW BEDFORD

Description of Work: Interior renovations including asbestos abatement and demolition, new restrooms, finishes, accessibility upgrades, new mechanical, electrical, plumbing and fire detection systems, new exterior railings

Job Location: 181 Hillman Street, New Bedford, MA 02740

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

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

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

• The wage schedule shall be incorporated in any advertisement or call for bids for the project as required by M.G.L. c. 149, § 27. The wage schedule shall be made a part of the contract awarded for the project whether they are employed by the prime contractor, a filed sub-bidder, or any sub-contractor.

• All apprentices working on the project are required to be registered with the Massachusetts Department of Labor Standards, Division of Apprentice Standards (DLS/DAS). Apprentice must keep his/her apprentice identification card on his/her person during all work hours on the project. Any apprentice working on the project who is not registered with DLS/DAS must be paid the lower apprentice wage rate at the applicable step as provided on the prevailing wage schedule. Any apprentice not registered with DLS/DAS regardless of whether or not they are registered with any other federal, state, local, or private agency must be paid the journeyworker’s rate for the trade.

• The wage rates will remain in effect for the duration of the project, except in the case of multi-year public construction projects. For construction projects lasting longer than one year, awarding authorities must request an updated wage schedule. Awarding authorities are required to request these updates no later than two weeks before the anniversary of the date the contract was executed by the awarding authority and the general contractor. For multi-year CM AT RISK projects, awarding authority must request an annual update no later than two weeks before the anniversary date, determined as the earlier of: (a) the execution date of the GMP Amendment, or (b) the execution date of the first amendment to permit procurement of construction services. Contractors are required to obtain the wage schedules from awarding authorities, and to pay no less than these rates to covered workers. The annual update requirement is not applicable to 27F “rental of equipment” contracts.

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

• Employees not receiving the prevailing wage rate set forth on the wage schedule may report the violation to the Fair Labor Division of the office of the Attorney General at (617) 727-3465.

• Failure of a contractor or subcontractor to pay the prevailing wage rates listed on the wage schedule to all employees who perform construction work on the project is a violation of the law and subjects the contractor or subcontractor to civil and

Issue Date: 05/28/2019

Wage Request Number: 20190528-068
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For apprentice rates see "Apprentice- PILE DRIVER"

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For apprentice rates see "Apprentice- OPERATING ENGINEERS*"

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For apprentice rates see "Apprentice- LABORER*"

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For apprentice rates see "Apprentice- LABORER*"
### BOILER MAKER

**BOILERMakers LOCAL 29**

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#### Apprentice - BOILERMaker - Local 29

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**Notes:**

Apprentice to Journeyworker Ratio: 1:4

### BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING)

**BRICKLAYERS LOCAL 3 (NEW BEDFORD)**

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**Notes:**

Apprentice to Journeyworker Ratio: 1:5

### BULLDOZER/GRADER/SCRAPER OPERATING ENGINEERS LOCAL 4

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For apprentice rates see "Apprentice- OPERATING ENGINEERS"

### CAISSON & UNDERPINNING BOTTOM MAN LABORERS - FOUNDATION AND MARINE

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For apprentice rates see "Apprentice- LABORER"

### CAISSON & UNDERPINNING LABORER LABORERS - FOUNDATION AND MARINE

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For apprentice rates see "Apprentice- LABORER"
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**LABORERS - FOUNDATION AND MARINE**

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For apprentice rates see "Apprentice- LABORER".

### CARBIDE CORE DRILL OPERATOR
**LABORERS - ZONE 2**

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For apprentice rates see "Apprentice- LABORER".

### CARPENTER
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#### Apprentice - CARPENTER - Zone 2 Eastern MA
**Effective Date**: 03/01/2019

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**Notes:**
- % Indentured After 10/1/17; 45/45/55/55/70/70/80/80
- Step 1&2 $30.69/ 3&4 $36.59/ 5&6 $53.59/ 7&8 $59.55
- Apprentice to Journeyworker Ratio: 1:5

### CARPENTER WOOD FRAME
**CARPENTERS - ZONE 2 (Wood Frame)**

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All Aspects of New Wood Frame Work
### Classification

**CARPENTER (Wood Frame) - Zone 2**

#### Effective Date - 04/01/2019

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### Notes:
- % Indentured After 10/1/17; 45/45/55/55/70/70/80/80
- Step 1&2 $19.45/ 3&4 $26.96/ 5&6 $34.19/ 7&8 $36.95
- Apprentice to Journeyworker Ratio: 1:5

**CEMENT MASONRY/PLASTERING**

**BRICKLAYERS LOCAL 3 (NEW BEDFORD)**

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**Issue Date:** 05/28/2019  **Wage Request Number:** 20190528-068  **Page 7 of 40**
## CEMENT MASONRY/PLASTERING - Eastern Mass (New Bedford)

### Apprentice -

**Effective Date:** 01/01/2019

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**Notes:**
- Steps 3,4 are 500 hrs. All other steps are 1,000 hrs.

**Apprentice to Journeyworker Ratio:** 1:3

### Chain Saw Operator

**Laborers - Zone 2**

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For apprentice rates see "Apprentice- Labors"

### Clam Shells/Slurry Buckets/Heading Machines

**Operating Engineers Local 4**

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For apprentice rates see "Apprentice- Operating Engineers"
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For apprentice rates see "Apprentice- OPERATING ENGINEERS".

### DELEADER (BRIDGE)
**PAINTERS LOCAL 35 - ZONE 2**

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### Apprentice - PAINTER Local 35 - BRIDGES/TANKS
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**Notes:**
- Steps are 750 hrs.
- Apprentice to Journeyworker Ratio: 1:1

### DEMO: ADZEMAN
**LABORERS - ZONE 2**

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For apprentice rates see "Apprentice- LABORER".
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**Notes:**

- Steps are 750 hours

**Apprentice to Journeyworker Ratio:** 2:3***

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**ELEVATOR CONSTRUCTOR**

| Issue Date: 05/28/2019 | Wage Request Number: 20190528-068 | Page 11 of 40 |
### ELEVATOR CONSTRUCTOR - Local 4

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#### Notes:

Steps 1-2 are 6 mos.; Steps 3-5 are 1 year

### Apprentice to Journeyworker Ratio: 1:1

#### ELEVATOR CONSTRUCTOR HELPER

ELEVATOR CONSTRUCTORS LOCAL 4

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For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"

#### FENCE & GUARD RAIL ERECTOR

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**Notes:**
- Steps are 750 hrs.
- % After 09/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)
- Step 1&2 $30.55/ 3&4 $36.49/ 5&6 $53.33/ 7&8 $59.33
- Apprentice to Journeyworker Ratio: 1:1

**FORK LIFT/CHERRY PICKER**

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For apprentice rates see "Apprentice- OPERATING ENGINEERS"

**GENERATOR/LIGHTING PLANT/HEATERS**

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For apprentice rates see "Apprentice- OPERATING ENGINEERS"

**GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS)**

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#### Notes:
Apprentice to Journeyworker Ratio: 1:3

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**Notes:**

Apprentice to Journeyworker Ratio: 1:6

**HVAC (Ductwork)**

- **Sheetmetal Workers Local 17 - B**
  - For apprentice rates see "Apprentice - Sheetmetal Worker"
  - Issue Date: 04/01/2019
  - Wage Request Number: 20190528-068
  - Total Rate: $66.39

**HVAC (Electrical Controls)**

- **Electricians Local 225**
  - For apprentice rates see "Apprentice - Electrician"
  - Issue Dates:
    - 03/01/2019: $41.64, $9.90, $13.15, $0.00, $64.69
    - 09/01/2019: $42.26, $10.15, $13.34, $0.00, $65.95
    - 03/01/2020: $42.87, $10.40, $13.94, $0.00, $67.21

**HVAC (Testing and Balancing - Air)**

- **Sheetmetal Workers Local 17 - B**
  - For apprentice rates see "Apprentice - Sheetmetal Worker"
  - Issue Date: 04/01/2019
  - Wage Request Number: 20190528-068
  - Total Rate: $66.39

**HVAC (Testing and Balancing - Water)**

- **Plumbers & Pipefitters Local 51**
  - For apprentice rates see "Apprentice - Plumber/Pipefitter" or "Plumber/Pipefitter"
  - Issue Date: 09/01/2018
  - Wage Request Number: 20190528-068
  - Total Rate: $70.24

**HVAC Mechanic**

- **Plumbers & Pipefitters Local 51**
  - For apprentice rates see "Apprentice - Plumber/Pipefitter" or "Plumber/Pipefitter"
  - Issue Date: 09/01/2018
  - Wage Request Number: 20190528-068
  - Total Rate: $70.24
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For apprentice rates see "Apprentice- LABORER"

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For apprentice rates see "Apprentice- LABORER"

<p>| Apprentice to Journeyworker Ratio: 1:4 |
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| Issued Date: | 05/28/2019 | Wage Request Number: | 20190528-068 | Page 17 of 40 |</p>
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**Notes:**
Apprentice to Journeyworker Ratio: 1:4

**JACKHAMMER & PAVING BREAKER OPERATOR**
*LABORERS - ZONE 2*

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For apprentice rates see "Apprentice- LABORER"

**LABORER**
*LABORERS - ZONE 2*

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Notes:

Apprentice to Journeyworker Ratio: 1:5

For apprentice rates see "Apprentice - LABORER"

Laborer: Carpenter Tender

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For apprentice rates see "Apprentice - LABORER"

Laborer: Cement Finisher Tender

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For apprentice rates see "Apprentice - LABORER"

Laborer: Hazardous Waste/Asbestos Remover

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| LABORER: MULTI-TRADE TENDER | 12/01/2018 | $33.52    | $7.85  | $14.44  | $0.00        | $55.81       |
| LABORERS - ZONE 2           | 06/01/2019 | $34.39    | $7.85  | $14.44  | $0.00        | $56.68       |
|                            | 12/01/2019 | $35.25    | $7.85  | $14.44  | $0.00        | $57.54       |
|                            | 06/01/2020 | $36.14    | $7.85  | $14.44  | $0.00        | $58.43       |
|                            | 12/01/2020 | $37.03    | $7.85  | $14.44  | $0.00        | $59.32       |
|                            | 06/01/2021 | $37.95    | $7.85  | $14.44  | $0.00        | $60.24       |
|                            | 12/01/2021 | $38.86    | $7.85  | $14.44  | $0.00        | $61.15       |
| For apprentice rates see "Apprentice- LABORER" |

| LABORER: TREE REMOVER       | 12/01/2018 | $33.52    | $7.85  | $14.44  | $0.00        | $55.81       |
| LABORERS - ZONE 2           | 06/01/2019 | $34.39    | $7.85  | $14.44  | $0.00        | $56.68       |
|                            | 12/01/2019 | $35.25    | $7.85  | $14.44  | $0.00        | $57.54       |
|                            | 06/01/2020 | $36.14    | $7.85  | $14.44  | $0.00        | $58.43       |
|                            | 12/01/2020 | $37.03    | $7.85  | $14.44  | $0.00        | $59.32       |
|                            | 06/01/2021 | $37.95    | $7.85  | $14.44  | $0.00        | $60.24       |
|                            | 12/01/2021 | $38.86    | $7.85  | $14.44  | $0.00        | $61.15       |
| This classification applies to all tree work associated with the removal of standing trees, and trimming and removal of branches and limbs when the work is not done for a utility company for the purpose of operation, maintenance or repair of utility company equipment. For apprentice rates see "Apprentice- LABORER" |

| LASER BEAM OPERATOR         | 12/01/2018 | $33.77    | $7.85  | $14.44  | $0.00        | $56.06       |
| LABORERS - ZONE 2           | 06/01/2019 | $34.64    | $7.85  | $14.44  | $0.00        | $56.93       |
|                            | 12/01/2019 | $35.50    | $7.85  | $14.44  | $0.00        | $57.79       |
|                            | 06/01/2020 | $36.39    | $7.85  | $14.44  | $0.00        | $58.68       |
|                            | 12/01/2020 | $37.28    | $7.85  | $14.44  | $0.00        | $59.57       |
|                            | 06/01/2021 | $38.20    | $7.85  | $14.44  | $0.00        | $60.49       |
|                            | 12/01/2021 | $39.11    | $7.85  | $14.44  | $0.00        | $61.40       |
| For apprentice rates see "Apprentice- LABORER" |

| MARBLE & TILE FINISHERS     | 02/01/2019   | $40.91    | $10.75 | $18.97  | $0.00        | $70.63       |
| BRICKLAYERS LOCAL 3 - MARBLE & TILE | 08/01/2019   | $41.99    | $10.75 | $19.11  | $0.00        | $71.85       |
|                            | 02/01/2020 | $42.50    | $10.75 | $19.11  | $0.00        | $72.36       |
|                            | 08/01/2020 | $43.58    | $10.75 | $19.26  | $0.00        | $73.59       |
|                            | 02/01/2021 | $44.09    | $10.75 | $19.26  | $0.00        | $74.10       |
|                            | 08/01/2021 | $45.21    | $10.75 | $19.42  | $0.00        | $75.38       |
|                            | 02/01/2022 | $45.68    | $10.75 | $19.42  | $0.00        | $75.85       |
### Apprentice - MARBLE & TILE FINISHER - Local 3 Marble & Tile

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**Notes:**

- Apprentice to Journeyworker Ratio: 1:3

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### MARBLE MASON, TILELAYERS & TERRAZZO MECH

**BRICKLAYERS LOCAL 3 - MARBLE & TILE**

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### Notes:

Apprentice to Journeyworker Ratio: 1:5

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

### MECH. SWEEPER OPERATOR (ON CONST. SITES)

OPERATING ENGINEERS LOCAL 4

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For apprentice rates see "Apprentice- OPERATING ENGINEERS"
### Apprentice - MILLWRIGHT - Local 1121 Zone 2

**Effective Date:** 04/01/2019

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**Notes:**
Steps are 2,000 hours

Apprentice to Journeyworker Ratio: 1:5

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### MORTAR MIXER

**LABORERS - ZONE 2**

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For apprentice rates see "Apprentice- LABORER"

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### OILER (OTHER THAN TRUCK CRANES, GRADALLS)

**OPERATING ENGINEERS LOCAL 4**

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For apprentice rates see "Apprentice- OPERATING ENGINEERS"

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### OILER (TRUCK CRANES, GRADALLS)

**OPERATING ENGINEERS LOCAL 4**

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For apprentice rates see "Apprentice- OPERATING ENGINEERS"

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### OTHER POWER DRIVEN EQUIPMENT - CLASS II

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For apprentice rates see "Apprentice- OPERATING ENGINEERS"
### Classification: PAINTER (BRIDGES/TANKS)  
**PAYERS LOCAL 35 - ZONE 2**

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### Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio: 1:1

### Classification: PAINTER (SIGN, PICTORIAL & DISPLAY)  
**PAYERS LOCAL 35 - ZONE 2**

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**Issue Date:** 05/28/2019  
**Wage Request Number:** 20190528-068  
**Page 24 of 40**
### Apprentice - PAINTER SIGN - Local 35 Zone 2

**Effective Date -** 06/01/2013

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**Notes:**
- Steps are 4 mos.

**Apprentice to Journeyworker Ratio:** 1:1

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**PAINTER (SPRAY OR SANDBLAST, NEW) * **

* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. PAINTERS LOCAL 35 - ZONE 2

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## Apprentice - PAINTER Local 35 Zone 2 - Spray/Sandblast - New

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**Notes:**
- Steps are 750 hrs.
- Apprentice to Journeyworker Ratio: 1:1

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PAINTER (SPRAY OR SANDBLAST, REPAINT)

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**Notes:**
- Steps are 750 hrs.
- Apprentice to Journeyworker Ratio: 1:1

### PAINTER (TRAFFIC MARKINGS)
**LABORERS - ZONE 2**

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*For Apprentice rates see "Apprentice- LABORER"

### PAINTER / TAPER (BRUSH, NEW) *
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.

**PAINTERS LOCAL 35 - ZONE 2**

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*Issue Date: 05/28/2019  Wage Request Number: 20190528-068*
### Apprentice -  PAINTER - Local 35 Zone 2 - BRUSH NEW

**Effective Date -** 01/01/2019

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**Effective Date -** 07/01/2019

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**Notes:**
- Steps are 750 hrs.
- Apprentice to Journeyworker Ratio: 1:1

### PAINTER / TAPER (BRUSH, REPAINT)

**PAINTERS LOCAL 35 - ZONE 2**

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**Effective Date:** 07/01/2019

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**Notes:**
- Steps are 750 hrs.
- Apprentice to Journeyworker Ratio: 1:1

---

**PANEL & PICKUP TRUCKS DRIVER**

**TEAMSTERS JOINT COUNCIL NO. 10 ZONE B**

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**PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK)**

**PILE DRIVER LOCAL 56 (ZONE 2)**

For apprentice rates see "Apprentice- PILE DRIVER"

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**PILE DRIVER**

**PILE DRIVER LOCAL 56 (ZONE 2)**

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**PIPELAYER LABORERS - ZONE 2**

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**PLUMBER & PIPEFITTERS LOCAL 51**

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**PNEUMATIC CONTROLS (TEMP.)**

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**PLUMBERS & PIPEFITTERS LOCAL 51**

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**For apprentice rates see "Apprentice- LABORER"**

**PNEUMATIC DRILL/TOOL OPERATOR LABORERS - ZONE 2**

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**For apprentice rates see "Apprentice- LABORER"**
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For apprentice rates see "Apprentice- LABORER"

| POWER SHOVEL/DERRICK/TRENCHING MACHINE OPERATING ENGINEERS LOCAL 4 | 12/01/2018 | $47.58 | $11.50 | $15.60 | $0.00 | $74.68 |
| | 06/01/2019 | $48.18 | $12.00 | $15.60 | $0.00 | $75.78 |
| | 12/01/2019 | $49.33 | $12.00 | $15.60 | $0.00 | $76.93 |
| | 06/01/2020 | $50.43 | $12.00 | $15.60 | $0.00 | $78.03 |
| | 12/01/2020 | $51.58 | $12.00 | $15.60 | $0.00 | $79.18 |
| | 06/01/2021 | $52.68 | $12.00 | $15.60 | $0.00 | $80.28 |
| | 12/01/2021 | $53.83 | $12.00 | $15.60 | $0.00 | $81.43 |

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

| PUMP OPERATOR (CONCRETE) OPERATING ENGINEERS LOCAL 4 | 12/01/2018 | $47.58 | $11.50 | $15.60 | $0.00 | $74.68 |
| | 06/01/2019 | $48.18 | $12.00 | $15.60 | $0.00 | $75.78 |
| | 12/01/2019 | $49.33 | $12.00 | $15.60 | $0.00 | $76.93 |
| | 06/01/2020 | $50.43 | $12.00 | $15.60 | $0.00 | $78.03 |
| | 12/01/2020 | $51.58 | $12.00 | $15.60 | $0.00 | $79.18 |
| | 06/01/2021 | $52.68 | $12.00 | $15.60 | $0.00 | $80.28 |
| | 12/01/2021 | $53.83 | $12.00 | $15.60 | $0.00 | $81.43 |

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

| PUMP OPERATOR (DEWATERING, OTHER) OPERATING ENGINEERS LOCAL 4 | 12/01/2018 | $32.03 | $11.50 | $15.60 | $0.00 | $59.13 |
| | 06/01/2019 | $32.28 | $12.00 | $15.60 | $0.00 | $59.88 |
| | 12/01/2019 | $33.07 | $12.00 | $15.60 | $0.00 | $60.67 |
| | 06/01/2020 | $33.82 | $12.00 | $15.60 | $0.00 | $61.42 |
| | 12/01/2020 | $34.60 | $12.00 | $15.60 | $0.00 | $62.20 |
| | 06/01/2021 | $35.35 | $12.00 | $15.60 | $0.00 | $62.95 |
| | 12/01/2021 | $36.14 | $12.00 | $15.60 | $0.00 | $63.74 |

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

| READY-MIX CONCRETE DRIVER TEAMSTERS LOCAL 59 | 06/01/2008 | $19.00 | $5.10 | $4.21 | $0.00 | $28.31 |

| RECLAIMERS OPERATING ENGINEERS LOCAL 4 | 12/01/2018 | $47.10 | $11.50 | $15.60 | $0.00 | $74.20 |
| | 06/01/2019 | $47.69 | $12.00 | $15.60 | $0.00 | $75.29 |
| | 12/01/2019 | $48.93 | $12.00 | $15.60 | $0.00 | $76.43 |
| | 06/01/2020 | $49.91 | $12.00 | $15.60 | $0.00 | $77.51 |
| | 12/01/2020 | $51.05 | $12.00 | $15.60 | $0.00 | $78.65 |
| | 06/01/2021 | $52.14 | $12.00 | $15.60 | $0.00 | $79.74 |
| | 12/01/2021 | $53.28 | $12.00 | $15.60 | $0.00 | $80.88 |

For apprentice rates see "Apprentice- OPERATING ENGINEERS"
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<th>Supplemental Unemployment</th>
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For apprentice rates see "Apprentice- LABORER"

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For apprentice rates see "Apprentice- OPERATING ENGINEERS"

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### Apprentice - ROOFER - Local 33

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**Notes:** **1:** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1
Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs.
(Hot Pitch Mechanics' receive $1.00 hr. above ROOFER)

Apprentice to Journeyworker Ratio:**

| ROOFER SLATE / TILE / PRECAST CONCRETE ROOFERS LOCAL 33 | 02/01/2019 | $43.61 | $11.50 | $15.90 | $0.00 | $71.01 |

For apprentice rates see "Apprentice- ROOFER"

| SHEETMETAL WORKER SHEETMETAL WORKERS LOCAL 17 - B | 04/01/2019 | $34.71 | $13.20 | $16.55 | $1.93 | $66.39 |
### SHEET METAL WORKER - Local 17-B

**Effective Date:** 04/01/2019

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#### Notes:

Apprentice to Journeyworker Ratio: 1:3

### SPECIALIZED EARTH MOVING EQUIP < 35 TONS

**Effective Date:** 06/01/2018

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### SPECIALIZED EARTH MOVING EQUIP > 35 TONS

**Effective Date:** 06/01/2018

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### SPRINKLER FITTER

**Effective Date:** 03/01/2019

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### Apprentice - SPRINKLER FITTER - Local 550 (Section B) Zone 2

**Effective Date: 03/01/2019**

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**Effective Date: 10/01/2019**

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**Notes:** Apprentice entered prior 9/30/10: 40/45/50/55/60/65/70/75/80/85
Steps are 850 hours

**Apprentice to Journeyworker Ratio: 1:3**

### STEAM BOILER OPERATOR

**OPERATING ENGINEERS LOCAL 4**

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For apprentice rates see "Apprentice- OPERATING ENGINEERS"
### TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN

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For apprentice rates see "Apprentice- OPERATING ENGINEERS"

### TELECOMMUNICATION TECHNICIAN

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### TELECOMMUNICATION TECHNICIAN - Local 223

**Apprentice - TELECOMMUNICATION TECHNICIAN - Local 223**

**Effective Date -** 03/01/2019

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**Notes:** See Electrician Apprentice Wages

- Steps are 750hrs
- Telecom Apprentice Wages shall be the same as the Electrician Apprentice Wages

### TERRAZZO FINISHERS

**BRICKLAYERS LOCAL 3 - MARBLE & TILE**

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Notes:

Apprentice to Journeyworker Ratio: 1:3

TEST BORING DRILLER
**LABORERS - FOUNDATION AND MARINE**

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For apprentice rates see "Apprentice- LABORER"

TEST BORING DRILLER HELPER
**LABORERS - FOUNDATION AND MARINE**

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For apprentice rates see "Apprentice- LABORER"

TEST BORING LABORER
**LABORERS - FOUNDATION AND MARINE**

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For apprentice rates see "Apprentice- OPERATING ENGINEERS"

For apprentice rates see "Apprentice- LABORER*"
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| EQUIPMENT OPERATOR (Class A CDL) | 09/03/2017 | $38.45 | $7.75 | $13.61 | $0.00 | $59.81 |
| OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104 | For apprentice rates see "Apprentice- LINEMAN" |

| EQUIPMENT OPERATOR (Class B CDL) | 09/03/2017 | $33.92 | $7.75 | $10.21 | $0.00 | $51.88 |
| OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104 | For apprentice rates see "Apprentice- LINEMAN" |

| GROUNDMAN | 09/03/2017 | $24.88 | $7.75 | $1.75 | $0.00 | $34.38 |
| OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104 | For apprentice rates see "Apprentice- LINEMAN" |

| GROUNDMAN -Inexperienced (~2000 Hrs.) | 09/03/2017 | $20.35 | $7.75 | $1.61 | $0.00 | $29.71 |
| OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104 | For apprentice rates see "Apprentice- LINEMAN" |

| JOURNEYMAN LINEMAN | 09/03/2017 | $45.23 | $7.75 | $16.61 | $0.00 | $69.59 |
| OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104 |

### Apprentice Rates - LINEMAN (Outside Electrical) - East Local 104

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<th>Pension</th>
<th>Supplemental</th>
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**Notes:**

Apprentice to Journeyworker Ratio: 1:2

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<th>Base Wage</th>
<th>Health</th>
<th>Pension</th>
<th>Supplemental</th>
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| TELEDATA LINEMAN/EQUIPMENT OPERATOR | 02/04/2019 | $28.93 | $4.70 | $3.14 | $0.00 | $36.77 |
| OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104 |

| TELEDATA WIREMAN/INSTALLER/TECHNICIAN | 02/04/2019 | $28.93 | $4.70 | $3.14 | $0.00 | $36.77 |
| OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104 |

| TREE TRIMMER | 01/31/2016 | $18.51 | $3.55 | $0.00 | $0.00 | $22.06 |
| OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104 |

This classification applies only to tree work done: (a) for a utility company, R.E.A. cooperative, or railroad or coal mining company, and (b) for the purpose of operating, maintaining, or repairing the utility company’s equipment, and (c) by a person who is using hand or mechanical cutting methods and is not on the ground. This classification does not apply to wholesale tree removal.

| TREE TRIMMER GROUNDMAN | 01/31/2016 | $16.32 | $3.55 | $0.00 | $0.00 | $19.87 |
| OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104 |

This classification applies only to tree work done: (a) for a utility company, R.E.A. cooperative, or railroad or coal mining company, and (b) for the purpose of operating, maintaining, or repairing the utility company’s equipment, and (c) by a person who is using hand or mechanical cutting methods and is on the ground. This classification does not apply to wholesale tree removal.
Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the pre-determined hourly wage rate established by the Commissioner under the provisions of the M.G.L. c. 149, ss. 26-27D. Apprentice ratios are established by the Division of Apprenticeship Training pursuant to M.G.L. c. 23, ss. 11E-11L.

All apprentices must be registered with the Division of Apprenticeship Training in accordance with M.G.L. c. 23, ss. 11E-11L.

All steps are six months (1000 hours.) Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

** Multiple ratios are listed in the comment field.
*** APP to JM; 1:1, 1:2, 2:3, 3:4, 4:5, 5:6, 6:7, 7:8, 8:9, 9:10, 10:11, 11:12, 12:13, 13:14, etc.
**** APP to JM; 1:1, 1:2, 2:3, 3:4, 4:5, 5:6, 6:7, 7:8, 8:9, 9:10, 10:11, 11:12, 12:13, 13:14, 14:15, etc.
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.2 PROJECT IDENTIFICATION AND DESCRIPTION OF WORK

A. Project Identification: The name of the Project on the Contract Documents is

HILLMAN STREET COMPLEX BUILDING 9 FIRST FLOOR RENOVATION
City of New Bedford
New Bedford, Massachusetts 02740

B. Work of this Contract shall include, but is not limited to, renovations to the first floor level of Building 9, associated/required abatement and demolition, new restrooms, new mechanical, electrical, plumbing and fire suppression systems to support the new first floor renovation and extending into other areas of the building as required by code and the configuration of these systems, including new railings at the exterior entrance ramps and stairs.

C. Hazardous Materials Remediation:
1. Remediation and abatement of hazardous materials in accordance with other sections of this PROJECT MANUAL are included in the work of this project.

D. The Contractor will have partial use of interior of building for the proposed improvements.

E. All work shall be in accordance with the Bidding and Contract Documents prepared by Architect, GORMAN RICHARDSON LEWIS ARCHITECTS, INC., 239 South Street, Hopkinton, Massachusetts 01748, and their consultants.

F. Contract Drawings: Refer to Project Manual Document 00 01 15, LIST OF DRAWINGS.

G. Existing Conditions: Refer to Project Manual Document 00 20 30 EXISTING CONDITIONS.

1.4 CONSTRUCTION PERIOD / LIQUIDATED DAMAGES

A. Time is of the Essence. Construction shall be executed in a timely and orderly manner as follows:
1. Award of Contract: on or about July 31, 2019
2. Commencement of Work: on or about August 7, 2019.

2. Substantial Completion Date: The undersigned agrees to substantially complete the Contract Work, including Certificate of Occupancy, 189 calendar days from date of Notice-To-Proceed.

3. Final Completion Date: The undersigned agrees to a final completion of the Base Bid Contract Work thirty calendar days from Date of Substantial Completion.

B. Refer to Document 00 40 10, FORM FOR GENERAL BID for Liquidated Damages for work not completed by the stipulated completion date.

1.5 CONDITIONS OF THE CONTRACT

A. Unless otherwise indicated, the Conditions of the Contract shall include the following:
   1. GENERAL CONDITIONS: Document 00 72 00 GENERAL CONDITIONS OF THE CONTRACT.

   2. CORI Requirements: All workers employed on the project by the General Contractor and all subcontractors shall be trained personnel who are directly employed and supervised by the Contractor and subcontractors and who have been cleared by a CITY of NEW BEDFORD CORI investigation, or other security credentials as may be required by the Owner.

1.6 WORK UNDER OTHER CONTRACTS

A. It is not anticipated that the work of this contract will require coordination with other construction contractors to execute the work defined by the Project Documents.

1.7 PERMIT AND INSPECTION FEES

A. Building permit shall be obtained by the General Contractor; fee for building permit will not be waived by the CITY of NEW BEDFORD.

B. All other permits including electrical, plumbing, and gas permits and inspection fees shall be paid for by the Contractor.

1.8 CONTRACTOR'S USE OF PREMISES

A. Contractor shall limit use of the premises for Work and for storage, to allow for:
   1. Work by other contractors not associated with this project.
   2. Owner occupancy of the building
   3. Public use of building grounds.

B. Coordinate use of premises under direction of Owner.
   1. Assume full responsibility for the protection and safekeeping of Products under this Contract, stored on the site.
   2. Move any stored Products, under Contractor's control, which interfere with operations of the Owner or separate contractor.
3. Obtain and pay for the use of additional storage or work areas needed for operations.
4. Move any stored Products, under Contractor’s control, which interfere with operations of the Owner or separate contractor.

C. Prior to beginning work of the Contract, the General Contractor shall meet with the Owner and the Architect to determine procedures regarding access to and use of site, exterior staging, parking and storage areas, tree protection, special site conditions and safety issues, and any other restrictions regarding the use of the site areas surrounding the construction.

D. The General Contractor shall keep all public and private access roads, and walks clear of debris caused by this work during the entire term of the Contract. The General Contractor shall repair all public and private streets, drives, curbs, walks, and other improvements where disturbed by work of, or related to, building operations, leaving them in as good condition after completion of the work as before operations started, in accordance with rules, regulations, and specifications of the public agencies having jurisdiction.

E. Parking for workmen’s personal vehicles shall be permitted only within designated areas.

F. Access roads and fire-lanes on and about the site shall be kept open and free at all times, including public roads and access to adjacent homes and businesses.

1.9 REMOVAL/REINSTALLATION OF EXISTING FIXTURES FURNITURE AND EQUIPMENT

A. Removal of existing Fixtures, Furniture, and Equipment (FF&E) from the project area except for Air Conditioners (02 41 13 SELECTIVE DEMOLITION), prior to commencement of the Work in areas to be agreed on by Owner and Contractor including temporary storage and re-installation will be performed by CITY of NEW BEDFORD personnel.

1.10 OWNER’S OCCUPANCY

A. The Owner will continue to occupy and use the building(s) outside the work area during the execution of the work.

B. Owner Occupancy: The Owner reserves the right to place and install equipment in completed areas of the work prior to Substantial Completion, provided that such occupancy does not interfere with completion of the Work.
   1. Execute Certificate of Substantial Completion for each specific Portion of the Work prior to Owner occupancy. After Owner occupancy Contractor shall allow free and clear access to all partially occupied areas.
1.11 EXAMINATION OF SITE AND PREBID CONFERENCE AND WALKTHROUGH

A. Prior to bidding the General Contractor and each of the Filed Subcontractors and other Subcontractors shall carefully examine the site and the Contract Documents to ensure their knowledge of conditions and requirements affecting the work. No claim for extra compensation or extension of time will be allowed for General Contractor's, Filed Subcontractor's or other Subcontractors failure to comply with this requirement nor will any condition at the site, whether or not in agreement with conditions shown or called for on the Contract Documents, be allowed as a basis or such claims, except as otherwise specifically provided for.

B. Refer to Document 00 11 00, INVITATION AND ADVERTISEMENT for pre-bid conference and scheduled site visits.

PART 2 - PRODUCTS
Not Used.

PART 3 - EXECUTION
Not Used.

END OF SECTION
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.2 SUMMARY

A. This Section administrative and procedural requirements required for handling modifications to the Contract Documents, including, but not limited to:
   1. Architect's Supplemental Instructions (ASI).
   2. Proposal Request (PR).
   5. Request for Information (RFI).

1.3 RELATED REQUIREMENTS

A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
   1. Document 00 72 00, GENERAL CONDITIONS; Methods of determining cost or credit to Owner resulting from changes in Work made on a time and material basis, and Contractor's claims for additional costs.
   2. Section 01 35 00 SUBMITTAL PROCEDURES.
   3. Section 01 77 20 SUBSTANTIAL COMPLETION.
   4. SECTION 01 77 30 PROJECT CLOSEOUT AND FINAL COMPLETION

1.4 DEFINITIONS

A. Change Order (CO):
   1. Definition: See Document 00700, GENERAL CONDITIONS.
   2. Form: AIA Document G701, Change Order, or other form acceptable to Owner and Architect.

B. Construction Change Directive (CCD):
   1. Definition: A written order to the Contractor, signed by Owner and Architect which amends the Contract Documents as described, and authorizes Contractor
to proceed with a change which affects the Contract Sum or the Contract Time, for inclusion in a subsequent Change Order.


C. Architect's Supplemental Instructions (ASI):
   1. Definition: A written order, instructions, or interpretations, signed by Architect making minor changes in the Work not involving a change in Contract Sum or Contract Time.
   2. Form: AIA Document G710, Architect's Supplemental Instructions, or other form acceptable to Owner and Architect.

D. Proposal Request (PR):
   1. Definition: A request to the Contractor, signed by the Architect, for submission of an itemized quotation for changes in the Contract Sum or Contract Time. This is not a Change Order or a direction to proceed with the Work.
   2. Form: AIA Document G709, Proposal Request, or other form acceptable to Owner and Architect.

E. Request for Information (RFI):
   1. Definition: A request from the Contractor to the Architect soliciting additional information regarding the Contract Documents.
   2. Form: AIA Document G716, Request For Information, or other form acceptable to Owner and Architect.

1.5 PRELIMINARY PROCEDURES

A. Architect may initiate change by submitting a Proposal Request (PR) to Contractor. Request will include:
   1. Detailed description of the Change, Products, and location of the change in the Project.
   2. Supplementary or revised Drawings and Specifications.
   3. The projected time span for making the change and a specific statement as to whether overtime work is, or is not, authorized.
   4. A specific period of time during which the requested price will be considered valid.
   5. Such request is for information only, and is not an instruction to execute the changes, nor to stop Work in progress.

B. Contractor may initiate changes by submitting a written notice to Architect, containing:
   1. Description of the proposed changes.
   2. Statement of the reason for making the changes.
   4. Statement of the effect on the work of separate contractors.
5. Documentation supporting any change in Contract Sum or Contract Time, as appropriate.

1.6 CONSTRUCTION CHANGE AUTHORIZATION

A. In lieu of Proposal Request, Architect may issue a Construction Change Directive for Contractor to proceed with a change for subsequent inclusion in a Change Order.

B. Directive will describe change in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change, and will designate the method of determining any change in the Contract Sum and any change in Contract Time.

C. Architect will sign and date the Construction Change Directive and send it to the Owner for authorization for the Contractor to proceed with the changes.

D. Once authorized by the Owner, the Architect will send the Construction Change Directive to the Contractor. Contractor shall sign and date the Construction Change Directive to indicate agreement with the terms therein.

1.7 DOCUMENTATION OF PROPOSALS AND CLAIMS

A. Support each quotation for a lump-sum proposal, and for each unit price which has not previously been established, with sufficient substantiating data to allow Architect to evaluate the quotation.

B. On request provide additional data to support time and cost computations including, but not limited to:
   1. Labor required.
   2. Equipment required.
   3. Products required.
      a. Recommended source of purchase and unit cost.
      b. Quantities required.
   4. Taxes (where applicable), insurance, and bonds.
   5. Credit for work deleted from Contract, similarly documented.
   6. Overhead and profit.

C. Support each claim for additional costs, and for work done on a time-and-material/force account basis, with documentation as required for a lump-sum proposal, plus additional information:
   1. Name of the Owner’s authorized agent who ordered the work, and date of the order.
   2. Dates and times work was performed, and by whom.
   3. Time record, summary of hours worked, and hourly rates paid.
4. Receipts and invoices for:
   a. Equipment used, listing dates and times of use.
   b. Products used, listing quantities.
   c. Subcontracts.

1.8 PREPARATION OF CHANGE ORDERS

A. Unless otherwise indicated, Architect will prepare each Change Order.

B. Form: Change Order, AIA Document G701.

C. Change Order will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change.

1.9 LUMP-SUM/FIXED PRICE CHANGE ORDER

A. Content of the Change Orders will be based on either:
   1. Architect's Proposal Request and Contractor's responsive Proposal as mutually agreed between Owner and Contractor.
   2. Contractor's Proposal for a change, as recommended by Architect.

B. Owner and Architect will sign and date the Change Order as authorization for the Contractor to proceed with the changes.

C. Contractor shall sign and date the Change Order to indicate agreement with the terms therein.

1.10 UNIT PRICE CHANGE ORDER

A. Content of Change Orders will be based on, either:
   1. Architect's definition of the scope of the required changes.
   2. Contractor's Proposal for a change, as recommended by Architect.

B. The amounts of the unit prices to be:
   1. Those stated in the Agreement.
   2. Those mutually agreed upon between Owner and Contractor.

C. When quantities of each of the items affected by the Change Order can be determined prior to start of the Work:
   1. Owner and Architect will sign and date the Change Order as authorization for Contractor to proceed with the changes.
   2. Contractor shall sign and date the Change Order to indicate agreement with the terms therein.
D. When quantities of the items cannot be determined prior to start of the Work:
   1. Architect and Owner will issue a Construction Change Directive directing Contractor to proceed with the change on the basis of unit prices, and will cite the applicable unit prices.
   2. At completion of the change, Architect will determine the cost of such work based on the unit prices and quantities used.
      a. Contractor shall submit documentation to establish the number of units of each item and any claims for a change in Contract Time.
   3. Architect will sign and date the Change Order to establish the change in Contract Sum and in Contract Time.
   4. Owner and Contractor will sign and date the Change Order to indicate their agreement with the terms therein.

1.11 TIME AND MATERIAL/FORCE ACCOUNT CHANGE ORDER/CONSTRUCTION CHANGE DIRECTIVE

A. Architect and Owner will issue a Construction Change Directive directing Contractor to proceed with the changes.

B. At completion of the change, Contractor shall submit itemized accounting and supporting data as provided in the Article "Documentation of Proposals and Claims" of this Section.

C. Architect will determine the allowable cost of such work, as provided in Document 00 72 01, GENERAL CONDITIONS.

D. Architect will sign and date the Change Order to establish the change in Contract Sum and in Contract Time.

E. Owner and Contractor will sign and date the Change Order to indicate their agreement therewith.

1.12 CORRELATION WITH CONTRACTOR'S SUBMITTALS

A. Periodically revise Schedule of Values and Request for Payment forms to record each change as a separate item of Work, and to record the adjusted Contract Sum.

B. Periodically revise the Construction Progress Schedule to reflect each change in Contract Time.
   1. Revise sub-schedules to show changes for other items of work affected by the changes.

C. Upon completion of work under a Change Order, enter pertinent changes in Record Documents.
PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements governing the Schedule of Values and the Contractor's Applications for Payment.

1.2 SCHEDULE OF VALUES

A. Format and Content: Present the Schedule of Values in the format stipulated in the Owner/Contractor agreement acceptable to the Architect.
   1. Line Items: Use the Project Manual Table of Contents as a guide to establish the line items for the Schedule of Values. Provide a breakdown of construction activities and their costs in sufficient detail to enable the Architect and the Owner to evaluate Applications for Payment.
   2. Each item in the Schedule of Values shall be complete, including its total cost to the Contractor and proportionate share of overhead and profit, except that costs of General Conditions shall be listed separately in the Schedule and shall not be included in overhead of other line items. Schedule of Values shall be agreed on at time of Contract Award or prior to submission of first Application of Payment, whichever is sooner.
   3. Stored Materials: For each part of the Work where an Application for Payment may include materials or equipment which have been purchased or fabricated, and stored offsite, provide separate values for cost of the materials.
   4. General Conditions Work: Attach break down for the General Conditions in a form consistent with the Owner’s Cost Breakdown Model.

B. Schedule Updating: Update and resubmit the Schedule of Values when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.3 APPLICATIONS FOR PAYMENT

A. Refer to “CITY OF NEW BEDFORD GENERAL CONDITIONS STANDARD VERTICAL CONSTRUCTION CONTRACT For Projects over $100,000 Subject to M.G.L. c. 149, s. 44A-F”, Article VIII.

B. If the General Contractor wishes to submit an advance Pencil Requisition, coordinate with the Architect to define a consistent schedule including date, time and procedure.
C. Number of Copies of final Requisition: Submit one executed original copy.

1. The Architect will review the final requisition in accordance with either the pencil requisition, or in accordance the General Conditions of the Contract.

2. The Architect will sign the requisition for the amount requested if the requisition is consistent with observed Work as of the date of the Requisition.

3. The Architect will adjust and sign the requisition in the event that the requisition is not consistent with observed Work as of the date of the Requisition.

4. The Architect will make two (2) copies of the requisition, distributing the original to the Owner for payment, and sending one of the copies to the General Contractor for record.

PART 2 - PRODUCTS (Not Used.)

PART 3 - EXECUTION (Not Used.)

END OF SECTION
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.2 SUMMARY

A. This Section specifies supervisory and administrative requirements for coordination of Work, including, but not limited to:
   1. Coordination of work of employees and subcontractors.
   2. Expedition of Work to assure compliance with schedules.
   3. Coordination of Work with that of other contractors and work by Owner.
   4. Compliance with orders and instructions of Architect or Owner.

1.3 RELATED REQUIREMENTS

A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
   1. Section 00 20 30 - EXISTING CONDITIONS
   2. Section 00 72 00 - GENERAL CONDITIONS.
   3. Section 01 73 29 - CUTTING AND PATCHING.
   4. Section 01 31 19 - PROJECT MEETINGS.
   5. Section 01 35 00 - SUBMITTALS.
   6. Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.
   7. Section 01 77 20 - SUBSTANTIAL COMPLETION.
   8. Section 01 77 30 - PROJECT CLOSEOUT AND FINAL COMPLETION.
   9. Section 02 82 13 - ASBESTOS ABATEMENT AND RELATED WORK.

1.4 COORDINATION BY CONTRACTOR

A. Coordinate the Work of the Contract, including other subcontractors. Anticipate areas where the installation of work will be restricted, congested, or difficult. Consult all affected subcontractors.
   1. All work associated with this Contract shall be fully coordinated with the Owner.
   2. Coordinate and comply with requirements regarding use of the building, access, dumpster locations, utilities, and related facilities, as agreed to between the Owner and Contractor.
1.5 EXISTING UTILITIES AND SERVICES

A. The Contractor shall immediately notify Architect and appropriate authorities when coming across an unknown utility or service line, and await decision as to how to proceed. When an existing utility or service line must be cut and plugged or capped, moved, or relocated, or has become damaged, Contractor shall notify Architect. If it is on a utility or provider side of metering or building perimeter, notify the utility or service entity involved as well.

B. Assure protection, support, or moving of utilities or services to adjust them to new work. Contractor shall be responsible for damage caused to existing, active utilities or services under work of this Contract, whether or not such utilities are indicated on Drawings, including resultant damages or injuries to persons or properties.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for project meetings, including but not limited to:
   1. Pre-Construction Meeting.
   2. Progress Meetings.
   3. Coordination Meetings.
   4. Special Meetings.

B. Representatives of contractors, subcontractors, and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.

C. The Owner and the Architect may attend any meeting to ascertain that Work is expedited consistent with Contract Documents and construction schedules.

1.3 RELATED REQUIREMENTS

A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
   1. Section 00 72 01 - GENERAL CONDITIONS.
   2. Section 00 31 35 - SUBMITTALS.
   3. Section 01 77 20 - SUBSTANTIAL COMPLETION.
   4. Section 01 77 30 - PROJECT CLOSEOUT AND FINAL COMPLETION.

1.4 MEETINGS, GENERAL

A. Organization, scheduling, agendas, invitations, minutes, etc. are the responsibility of the General Contractor unless the meeting is called by the Architect.
B. Agendas: Prepare agendas for Project Meetings. Distribute copies to parties in attendance. It is preferable to distribute Agendas two (2) working days in advance of each meeting, however, the realities of the project may require updates to the Agendas immediately before the meetings.

C. Meeting Notices: Prepare and distribute written notices of Project Meetings two (2) working days in advance of each meeting.

D. Arrangements: Make physical arrangements for Project Meetings, including but not limited to:
   1. Arranging space, table and seating.

E. Preside at Project Meetings. Unless the Architect calls for a special meeting, the General Contractor shall preside at all meetings.

F. Minutes: Record Minutes of Project Meetings, including significant procedures and decisions. Record Minutes for special meetings called by the Architect will be the responsibility of the Architect.

G. Distribution of Minutes: Reproduce and distribute copies of Project Meeting minutes not later than three (3) working days after each meeting to participants of meeting, to parties affected by decisions made at meetings, and to Architect.  
   1. Electronic Distribution is preferred, with supplemental paper copies available at each meeting.

1.5 PRE-CONSTRUCTION MEETING

A. Schedule not later than 10 days after date of Notice to Proceed.

B. Location: A central site, at the HILLMAN STREET COMPLEX if possible, convenient for all parties, designated by Contractor.

C. Attendance: Require and notify the following to attend
   1. Owner's Representative.
   3. Contractor's Superintendent.
   4. Major subcontractors.
   5. Lift Contractor
   8. Others as appropriate.

D. Suggested Agenda:
   1. Discussion of major subcontractors and suppliers.
   2. Projected Construction Progress Schedules.
   3. Critical work sequencing.
   4. Equipment and material deliveries and priorities.
5. Project Coordination, including designation of responsible personnel.
6. Procedures and processing of:
   a. Submittals.
   b. Change Orders.
   c. Application for Payment.
8. Procedures for maintaining:
   a. As-Designed Documents (by Architect)
   b. As-Built Documents (by General Contractor and Sub-Contractors)
   c. Project Record Documents (by General Contractor and Sub-Contractors)
9. Use of premises:
   a. Office, work, and storage areas.
   b. Owner's requirements.
10. Construction facilities, controls, and construction aids.
11. Temporary utilities.
14. Contractor Parking
15. Deliveries
17. Project Progress Meetings.

1.6 PROJECT PROGRESS MEETINGS

A. Schedule weekly meetings, unless it is mutually agreed by Owner, Architect and General Contractor that another meeting schedule is appropriate.

B. Location of the meetings: On-site at location acceptable to the Owner at or adjacent to the HILLMAN STREET COMPLEX.

C. Attendance: Require and notify the following to attend:
   1. Owner’s Representative.
   2. Suppliers, as appropriate to the agenda.
   3. Others as may be selected by the General Contractor or recommended by the Architect.

D. Architect’s attendance is optional.

E. Suggested Agenda:
   1. Review and approval of minutes of previous meeting.
   2. Review of Work progress since previous meeting.
   3. Field observations, problems and conflicts.
   4. Problems which impede Construction Progress Schedule.
5. Review of off-site fabrication and delivery schedules.
6. Corrective measures and procedures to regain projected schedule.
7. Report on and if needed revisions to Construction Progress Schedule.
8. Progress schedule during succeeding work period.
   a. One Week look ahead
   b. Two week look ahead
9. Review submittal schedules; expedite as required.
11. Pending changes and substitutions.
12. Review proposed changes for:
   a. Effect on Construction Progress Schedule and on completion date.
   b. Effect on other contracts of the Project.
13. Other business.

1.7 COORDINATION MEETINGS

A. Conduct Coordination Meetings as necessary to properly coordinate the trades. Require representation of parties involved in coordination or planning of activities involved.

1.8 SPECIAL MEETINGS

A. Conduct Special Meetings as required throughout the course of the Work. Special meeting issues may include, but are not limited to:
   1. Safety issues.
   2. Labor issues.
   3. Special schedule issues.

B. The Owner and the Architect reserve the right to call special meetings when they deem it to be in the best interest of the project.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION
PART 1 – GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements required for handling documentation to record and log Architect's identification of nonconforming Work.

1.2 RELATED REQUIREMENTS

A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
   1. GENERAL CONDITIONS; Conditions of the Contract and responsibilities of each party regarding Work.
   2. Section 01 35 00 - SUBMITTAL PROCEDURES.
   3. Section 01 77 20 - SUBSTANTIAL COMPLETION

1.3 DEFINITIONS:

A. 'Exceptions': Work of the General Contractor observed by the Architect during construction that is not in accordance with the Contract Documents.

B. Exceptions Summary Log: A log prepared by the Architect which records status of all 'Exceptions'.

1.4 PROCEDURES

A. Field Reports:
   1. Field Reports, when issued, shall be distributed as a record to the Owner, Authority Having Jurisdiction (AHJ) and the General Contractor.
   2. Field Reports will be issued each time the Architect visits the site during construction.

B. The Architect will, in addition to identifying 'Exceptions' in the Architect's Field Report, create and maintain throughout the construction period, an 'Exceptions Summary Log'. The Exceptions Summary Log shall contain the following information:
   1. The Field Report number and Exception number
   2. The date the Exception is first recorded
   3. A written description of the Exception
   4. The Sub-contractor responsible for correcting the Exception
   5. The date by which the Exception is to be corrected
   6. The date on which the General Contractor or Sub-contractor reports the Exception as having been corrected
   7. The date on which the Architect verifies that the Exception has been corrected
8. Remarks summarizing additional information about the Exception

C. General Contractor’s Responsibilities:
1. The General Contractor will be responsible to inform all other Contractors and Sub-contractors responsible for the correction of Exceptions in a timely manner to allow for the correction of the Exception within the time specified on the Exceptions Summary Log.
   a. The Architect or the Owner will not be responsible for notifying other contractors and subcontractors.
   b. Uncorrected Exceptions:
      i. If an Exception is not corrected on or before “the date by which the Exception is to be corrected” as identified in the Field Reports and/or the Exceptions Summary Log and if, in the sole judgment of the Architect, the uncorrected Exception is detrimental to the achieving the intent of the Contract Documents then the Architect shall issue a Notice Of Deficiency (NOD) to the General Contractor, Owner and Authority(ies) Having Jurisdiction (AHJ). Such NOD shall freeze all payments to the General Contractor until the Exception is corrected to the satisfaction of the Architect.
      ii. If an Exception is not corrected on or before “the date by which the Exception is to be corrected” as identified in the Field Reports and/or the Exceptions Summary Log and if, in the sole judgment of the Architect, the uncorrected Exception is not detrimental to the achieving the intent of the Contract Documents then the Architect shall move the item to the Punch List.

2. The General Contractor shall inform the Architect that the Exception has been corrected.

D. Architect’s Responsibilities:
1. The Architect will include the date of the General Contractor’s notification on the Exceptions Summary Log.
   a. In consultation with the General Contractor, the Architect will identify a “Fix-by Date” and record same in both Field Report and Exceptions Summary Log.

2. During the next regularly scheduled site visit after the established “Fix-by Date”, the Architect will observe the work to verify that the Exception has been corrected.

3. If the Architect verifies that the Exception has been corrected, the Architect will note that the Exception has been corrected on the Field Report and include the date of verification on the Exceptions Summary Log.

4. If the Architect cannot verify that the Exception has been corrected, the Architect will notify the General Contractor that the Exception cannot be observed and require the General Contractor to perform selected demolition to remove visually obstructing work or perform such non-invasive verification satisfactory to the Architect.
5. In circumstances of time sensitive work photographs taken by the General Contractor may be acceptable to the Architect providing such arrangements are made in advance. Under no other circumstance will photographs taken by any party be accepted by the architect for corrected exception verification.

1.5 CORRECTION OF ALL EXCEPTIONS:

A. The General Contractor is responsible for correcting or cause correction of any and all Exceptions in a timely manner.

B. All Exceptions must be corrected or listed in the Punch List prior to the Architect conducting inspections to determine the date or dates of Substantial Completion.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION
PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.2 SUMMARY

A. This section sets forth administrative and procedural requirements for the following types of submittals:
   1. Shop Drawings
   2. Product Data
   3. Samples.
   4. Quality Control Submittals
   5. Submittals for commissioning.

1.3 RELATED REQUIREMENTS

A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
   1. Submittals Required: Types of submittals required are listed in each product section.
   2. Reports of field tests and inspections: Section 01 45 00, "Quality Control".
   3. Closeout Submittals: Submittals of final property survey, warranties, record documents, operating manuals, maintenance materials are specified in Section 01 77 20, "Substantial Completion" and Section 01 77 30 “Project Closeout / Final Completion”.

1.4 SUBMITTAL SCHEDULE

A. General Contractor to submit to the Architect within 10 days from the date of Owner Authorization to proceed with construction, a Schedule of Submittals. For each submittal:
   1. Identify the proposed date for General Contractor to make the submission to the Architect
   2. Identify date General Contractor requires reviewed submittal back from the Architect.
   3. Allow ten working days from date of Architect's receipt of Submittal for Architect's review.
4. Schedule submittals so that Architect may review them in a sequence that reflects the logical sequence of the Work.
5. Identify priority if needed.
6. Submit items which must be coordinated, such as colors of finishes, at the same time, so that submittals may be reviewed together.

B. General Contractor will be responsible for delay resulting from failure to present submittals to the Architect in accordance with the Submittal Schedule.
   1. The Architect and the Design Team will allot time in accordance with the Submittal schedule.
   2. Un-coordinated modifications of the submittal schedule without Architect and Design Team input will jeopardize procurement.

C. Procurement prior to satisfactory submittal review is at the procurer’s sole risk.

1.5 COMPLYING PRODUCTS

A. For products specified only by reference standard, select any product meeting that standard.

B. For products specified by description of physical properties or performance, submit a product meeting the specified requirements.

C. For products specified by naming one or more brand names or manufacturers, select one of the named products.

D. The Architect will not consider requests for substitutions in place of specified products.

1.6 GENERAL CONTRACTOR’S REVIEW, RECORDING AND TRANSMITTAL RESPONSIBILITIES

A. In advance of presenting any submittal to the Architect and the Design Team, review each submittal from Contractors, Subcontractors, Suppliers and Fabricators.

B. As a minimum, verify conformance with the Construction documents for:
   1. Materials.
   2. Field dimensions.
   3. Adjacent construction.
   4. Conformance with specified environmental and job conditions.
   5. Coordination with other work.

C. Stamp each Submittal with General Contractor’s review stamp and sign to signify that it has been reviewed by and that information given on the submittals has been verified by the Design Build Constructor.
   1. Transmit each submittal with a numbered letter of transmittal that identifies:
a. Sequence number.
b. Date of transmittal.
c. Project name and Architect's job number.
d. Contractor, Subcontractor, Supplier or Fabricator name
e. Applicable specification section and identification of the product(s) or item(s) being submitted.

2. Maintain a log of submissions by number indicating status of each.

D. The Architect will review only those submittals explicitly required by the Contract Documents or requested as the work proceeds.

E. The Architect will review only submittals bearing the General Contractor’s stamp as evidence of review.

F. In reviewing Shop Drawings, Product Data, Samples and similar submittals, the Architect shall be entitled to rely upon the Contractor's representation that the information given is correct and accurate.

1.7 SPECIFICS REQUIREMENTS FOR EACH TYPE OF SUBMITTAL:

A. Shop Drawings:
   1. Prepare shop drawings specific to this project to describe the fabrication and installation of products.
   2. Draw clearly and present complete information
   3. Include plans, elevations and large-scale details, as appropriate to the work shown
   4. Note field dimensions and adjacent construction
   5. Include schedules, patterns, calculations and instructions regarding coordination and installation as required
   6. Manufacturer's pre-printed standard details are not acceptable as shop drawings
   7. Drawings made from Contract Drawings are not acceptable as shop drawings.

B. Quantity of Shop Drawing Submittals:
   1. If submitted as hard copy:
      a. Submit five (5) copies of each submittal.
      b. Three (3) reviewed copies will be returned or at the discretion of the Architect, the submittal will be scanned and returned electronically.
   2. If submitted electronically:
      a. Only a reviewed electronic copy will be returned.

C. Architectural shell drawings in electronic format ("CADD Drawings") may be obtained upon request by the Contractor to the Architect, for use by the Contractor, Subcontractors, Fabricators or Suppliers to facilitate the preparation of shop drawings, subject to execution of an "Agreement and Release" in the
SUBMITTAL PROCEDURES

form required by the Architect, and a fee to compensate the Architect for its service in providing the documents for this use.

1. If “CAD Drawings” are used in the preparation of shop drawings, do not extract dimensions from the drawings; refer to the written dimensions, and then check these for internal consistency and verify them in the field as the work progresses.

2. The Contractor and the subcontractor, fabricator, or other entity preparing shop drawings remains solely responsible for the information on the shop drawings.

1.8 PRODUCT DATA

A. Submit manufacturer’s printed data:
   1. Clearly mark each copy to identify pertinent products or models; cross out information which is not applicable to the work and supplement standard information to provide information which is specifically applicable to the work.
   2. Show performance characteristics and capacities.
   3. Show dimensions and clearances required.
   4. For equipment, show wiring or piping diagrams and controls.

B. Quantity of Product Data Submittals:
   1. If submitted as hard copy:
      a. Submit five (5) copies of each submittal.
      b. Three (3) reviewed copies will be returned
   2. If submitted electronically:
      a. Only a reviewed electronic copy will be returned.

1.9 SAMPLES

A. Provide samples of size specified or of adequate size to permit proper evaluation of material by the Architect.

B. Where variations in color or in other characteristics are to be expected, submit samples showing the maximum range of variation.

C. Tag or permanently mark each sample to identify the item; indicate applicable transmittal number on tag.

D. Quantity of Sample Submittals:
   1. Submit three (3) of each samples.
      a. Two (2) reviewed samples will be returned.
1.10 QUALITY CONTROL SUBMITTALS:

A. Quality control submittals:
   1. Include information provided after submittal acceptance by the Architect and prior to delivery and installation of products.
   2. Document compliance with the Contract Documents
   3. Are furnished for the Architect’s information only
   4. Will not receive the Architect’s review stamp unless specifically stated under the submittals subheading of the specification sections.

B. Quality control submittals required by various sections of these specifications include, without limitation:
   1. Qualifications of manufacturer or installer.
   2. Test reports on fabricated products and mixes.
   3. Certificates.
   4. Material safety data sheets.

C. Quantity of Quality Control Submittals:
   1. If submitted as hard copy:
      a. Submit three (3) copies of each submittal.
      b. No reviewed copies will be returned
   2. If submitted electronically:
      a. No reviewed electronic copy will be returned.

D. Include on the accompanying transmittal form:
   1. Date of submission.
   2. Project title and number.
   3. Names of Contractor and the subcontractor, fabricator and installer, as applicable.
   4. Specification Section number and identification of the product.
   5. If applicable, the name, address and telephone number of the testing or inspecting agency or certifying agency or engineer (or similar applicable information); this information need not be on the transmittal form if it is clearly readable on the report or certification.

1.11 ARCHITECT’S REVIEW

A. The Architect will stamp each submittal to indicate the action taken and the General Contractor shall comply with the direction given.

B. The Architect will accept only original hard copy or original electronic copy.

C. The Architect will take no action on any submittal which has been faxed at any time prior to submittal to the Architect.
D. The Architect will take no action on any submittal which is faxed to the Architect.

E. The Architect will take no action on any submittal which is submitted by any project entity other than the General Contractor.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.2 REQUIREMENTS INCLUDED

A. Coordinate Work and schedule elements of alterations and renovation work by procedures and methods that expedite completion of the Work.

B. In addition to demolition specified in Section 02 41 13 - SELECTIVE DEMOLITION as well as required elsewhere in this project and/or indicated on Drawings; cut, move and remove miscellaneous existing work as necessary to provide access and to allow alterations and new work to proceed. Include but do not limit work to:
   1. Repair and removal of hazardous and unsanitary conditions and materials.
   2. Removal of unsuitable and extraneous materials not otherwise marked for salvage, such as debris such as rotted wood, rusted metals, and deteriorated concrete.
   3. Cleaning of surfaces, and removal of surface finishes as needed to install new work and finishes.

C. Patching, repair, and refinishing existing work intended for reuse, to specified condition for each material, with suitable transition to adjacent new items of construction.

1.3 ALTERATIONS, CUTTING AND PROTECTION

A. Ensure that work is performed by workers qualified for each condition and material encountered.

B. Cut and remove minimum materials necessary and avoid damage to adjacent work intended for reuse.

C. Cut finish surfaces by methods that terminate surfaces in a straight line at natural points of division.

D. Cutting and patching work shall comply with requirements of Section 01 73 29, CUTTING AND PATCHING.
E. Protect existing finishes, equipment, and adjacent work scheduled to remain from damage from weather and extremes of temperature.

F. Provide temporary enclosures to separate work areas from existing building and from areas occupied by Owner, and to provide weather protection.

PART 2 - PRODUCTS

2.1 SALVAGED MATERIALS FOR REUSE

A. Salvage sufficient quantities of cut and removed materials to replace damaged work of existing construction when material is not readily obtainable on current markets.
   1. Store salvaged items in dry, secure place on site.
   2. Items not required for use in repair of existing work shall remain Owner's property.
   3. Do not incorporate salvaged or used materials in new construction without Architect's approval.

2.2 PATCHING, EXTENDING, AND MATCHING

A. Provide same products or types of construction as those in existing structure, as needed to patch, extend, and match existing work.

B. Generally, Contract Documents do not define products or standards of workmanship present in existing construction; determine products and workmanship by inspection and testing. Architect will judge workmanship and materials against existing as a sample of comparison.

C. Provide products, finishes, and types of construction for patching, extending and matching shall be performed as necessary to make work complete and consistent to identical standards of quality.

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Patching of existing construction to accommodate work of various Sections shall be performed under Sections that specify methods and materials similar to adjacent existing construction, in the following areas:
   1. Removal and patching of damaged material where indicated.
B. Patch and extend existing work using skilled workers who are capable of matching existing quality of workmanship. Quality of patched or extended work shall be equal to that specified for new work.

3.2 TRANSITION FROM EXISTING TO NEW WORK

A. When new work abuts or finishes flush with existing work, make smooth transition. Patched work shall match existing adjacent work in texture and appearance so that patch or transition is not visible from 5 ft. away.

B. When finished surfaces are cut so that smooth transition with new work is not possible, terminate existing surface in a neat manner along straight line at natural line of division. Provide trim appropriate to finished surface.

C. Transition from existing carpeted floors to new VCT will depend on the cutting of the carpet during demolition. In addition, cut carpet so all new partition bear on existing wood floor below carpet.

3.3 CLEANING

A. Perform periodic and final cleaning as specified in Section 01 77 30, PROJECT CLOSEOUT AND FINAL COMPLETION.

B. At completion of work of each Section, clean area and prepare surfaces for work of other Sections.

C. At completion of alterations work in each area, provide final cleaning and return space to condition suitable for use by Owner and occupants of the building.

END OF SECTION
PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. General Conditions, Supplementary Conditions and applicable parts of Division 1 form a part of this specification and the Contractor shall consult them in detail for instructions.

B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade.

1.02 RELATED WORK UNDER OTHER SECTIONS

A. Asbestos Remediation

1.03 HAZARDOUS MATERIALS PROCEDURE

A. Asbestos:

1. Asbestos Materials Exist On-Site: There are accessible and inaccessible asbestos containing materials (ACM) in the existing buildings. ACM affected by the Renovation project are included under this contract. The General Contractor shall refer to items below. The General Contractor shall formally notify each subcontractor that there are ACM existing in the buildings. Hidden ACM may only be found during Demolition. Refer to items 2 and 3 below.

2. Unknown and inaccessible ACM: During the Demolition work of the Contract, it is possible that previously unknown asbestos materials may be discovered in currently concealed locations.

3. Notification: If the General Contractor discover or encounter any ACM during the performance of the work, the General Contractor shall immediately:
   a. Stop work, notify the Owner and OPM about the presence of suspect ACM and request instructions for proper action, and
   b. Take whatever steps and measures are necessary to reduce, control or eliminate the risk of exposure of workers and the public to the ACM.
   c. Every effort will be made to obtain DEP (12 working day notification period) waivers to remove hidden or unforeseen ACM by the asbestos contractor. The General Contractor shall allow enough time for the removal of the ACM at no additional charges to the owner for delays and should waivers be denied.

4. Responsible Person On-Site: The General Contractor shall designate one of its senior on-site employees to oversee coordination between the Architect, the General Contractor, and all subcontractors with respect to hazardous materials issues.

5. Responsibility for Hazardous Material Discovery: It is the sole responsibility of the General Contractor and its Subcontractors to undertake whatever measures, methods of procedures are necessary, required or otherwise appropriate to safeguard the health and safety of all workers and members of the public with respect to
identification and discovery of previously unknown hazardous materials during the work of the Project.

6. Indemnification: To the fullest extent permitted by law, the General Contractor and General Contractor shall indemnify and hold harmless the Owner and the Architect and their agents and employees from and against all claims, damages, losses and expenses including, but not limited to, attorneys’ fees arising out of or relating to the performance of the Work, including the discovery or identification of any hazardous materials, provided that any such claim, damage, loss or expense if attributable to bodily injury, sickness, disease or death, or to damage to or destruction of tangible property (other than the Work itself) including the lose of use resulting therefrom; and is caused in whole or in part by any negligent act or omission of the General Contractor and General Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.

B. Lead:

1. The General Contractor and all Trades shall be made aware that Lead Based Paint exists on painted surfaces throughout the buildings.
2. It is the General Contractor and all Trades responsibility to either test painted surfaces or assume that all existing painted surfaces are coated with Lead Paint. All costs for testing shall be the responsibility of the General Contractor and all Trades at no additional cost to the Owner.
3. All the work of this Contract shall conform to the standard set by all applicable Federal, State and Local laws, regulations, ordinance and guidelines in such from in which they exist at the time of the work on the Contract and as may be required by subsequent regulations.
4. The General Contractor shall retain the services of a Massachusetts licensed lead abatement contractor to remove/de-lead painted surfaces as needed during the project.
5. The General Contractor and all Trades are solely responsible for means and methods, and techniques used for demolition and lead control. The General Contractor and all Trades shall collect, and control lead contaminated debris and to properly remove and dispose of lead contaminated soil around each building due to demolition activities.
6. The General Contractor and all Trades shall at his own cost and expense comply with all laws, ordinance, rules and regulations of Federal, State, Regional and Local authorities during demolition, prepping, sanding, cutting, burning, scraping, painting over, grinding and regarding handling, storing and disposing of lead and lead contaminated waste material.
7. The General Contractor and all Trades shall submit to the Architect prior to commencing of work the following:
   a. Written respiratory and notification program
   b. Written lead compliance program in accordance with OSHA regulations including:
      1. Training requirement certifications.
      2. Supervisor qualifications.
      3. Written compliance program specific to this project
4. Respirators fit test records.
5. Medical surveillance certificates.

8. The EPA and the DEP require demolition debris with lead to be tested in accordance with the Toxicity Characteristic Leaching Procedure (TCLP) to determine the potential for significant amounts of lead to leach out of the waste. If the results are below the DEP standard (5.0 ppm), the waste may be disposed of in a conventional landfill for demolition debris. If, however, the TCLP results are above the DEP standard, the waste must be disposed of in a DEP approved, hazardous waste landfill. The General Contractor and all Trades shall at own cost and expense perform all required testing of waste by the TCLP. The General Contractor and all Trades must submit to the Owner copy of tests performed and all waste shipment records prior to disposing of debris. The Owner reserves the right to have own TCLP samples collected to verify results. All disposal costs shall be at the General Contractor and all Trades responsibility.

9. The following references are cited as current applicable publications. This project is subject to compliance with the all regulations including but not limited to:
   a. Commonwealth of Massachusetts, Department of Labor and Work Force Development 454 CMR 11.00, Structural Painting Safety Code, as currently amended.
   b. Commonwealth of Massachusetts, Department of Environmental Protection, and Hazardous Materials Regulations at 310 CMR 30.00 as currently amended.
   e. Commonwealth of Massachusetts, Department of Labor and Work Force Development 454 CMR 22.00.
   f. Commonwealth of Massachusetts, Department of Environmental Protection, 310 CMR 6.0-8.0.
   g. Commonwealth of Massachusetts, Department of Environmental Protection ABC rubble rules.

10. All above regulations are applicable to this project. Where there is a conflict between this section and the applicable regulations, the more stringent requirement shall prevail.

C. PCB’s:

1. The General Contractor and all Trades shall be made aware that buildings materials (Material) including but not limited to painted surfaces, glue, roofing, coatings, caulking and other buildings materials are likely to contain >1 ppm of Polychlorinated Biphenyls PCB’s.
2. Due to the difficulty associated with exhaustive testing of all surfaces, glue, and coatings within the buildings, the Owner has elected to direct the General Contractor and all Trades to assume that these surfaces do, in fact, contain PCB’s and to take all necessary steps for their compliant removal and disposal.
3. EPA does not require testing and therefore, testing will not be performed or permitted.
4. All the work of this Contract shall conform to the standard set by all applicable Federal, State and Local laws, regulations, ordinance and guidelines.
5. The General Contractor and all Trades are solely responsible for means and methods, and techniques used for demolition and control. The General Contractor and all Trades shall collect and control PCB’s contaminated debris and soil.
6. The General Contractor and all Trades shall at its own cost and expense comply with all laws, ordinance, rules and regulations of Federal, State, Regional and Local authorities during prepping, sanding, cutting, burning, scraping, painting over, grinding and regarding handling, storing and disposing of contaminated waste material and during demolition of the buildings.

E. Silica Dust:

   1. The General Contractor and all Trades shall be made aware that buildings materials (Material) may contain Silica.
   2. Due to the difficulty associated with exhaustive testing, the Owner has elected to direct the General Contractor and all Trades to assume that Silica was found.
   3. The General Contractor and all Trades shall review and comply with most recent US Department of Labor Final Rule and shall take extra precautions to protect workers and other personnel on site.

PART 2 – (PRODUCTS) Not Used

PART 3 – (EXECUTION) Not Used

END OF SECTION
PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 INTENT

A. General: Provide and coordinate Mock-Up assemblies at Project site for Architect's review and acceptance, in accordance with requirements of the Contract Documents. Refer to individual Specification Sections for Mock-Up requirements. Generally, without limitation, Mock-Ups on site include the following:
   1. Mock-Ups of individual pieces of the work, as specified within individual Specification Section.
   2. It shall be the responsibility of the General Contractor to coordinate the work of the related Specification Sections so that each Mock-Up meets the specified requirements.

B. Mock-Ups to be prepared for the purposes of:
   1. Verification of product and material selections
   2. Demonstration of aesthetic effects
   3. Evaluate material quality
   4. Establish acceptable execution and workmanship
   5. Review Coordination and construction
   6. Testing and operation

C. Requirements:
   1. No Mock-Up shall be any part of the final construction unless the Specification Section specifically states otherwise. If stated otherwise it shall be termed an "In-Place Mock-Up".
   2. No permanent construction of any component of a Mock-Up shall begin until the entire Mock-Up is completed and accepted by the Architect.
   3. Where Mock-Ups illustrate intersections with existing construction and/or materials, simulation is to be provided by materials with physical properties identical or similar as possible to the existing materials.

1.3 RELATED WORK
A. Examine Contract Documents for requirements that affect Work of this Section. Other Specification Sections that directly relate to Work of this Section include, but are not limited to:
1. Section 01 41 00 - QUALITY ASSURANCE.

1.4 DEFINITIONS

A. In-Place Mock-Ups: Full-size, physical assemblies that are constructed in-place and remain part of final construction.
1. In-place mock-ups will be used to verify selections made under sample submittals, to demonstrate aesthetic effects, qualities of materials and execution, and to review construction, coordination, testing, or operation.
2. Approved in-place mock-ups establish the standard by which the Work will be judged.
3. Approved In-Place Mock-Ups may remain part of the completed Work.

1.5 SUBMITTALS

A. Schedule: General Contractor shall submit a schedule of Mock-Up construction, including dates for Mock-Up review by the Architect.
1. Mock-up schedule shall be reviewed at each progress meeting, revised and resubmitted as required.
2. Schedule shall allow sufficient time for Mock-Ups which are not accepted to be reconstructed and reviewed until accepted by the Architect.

B. Shop Drawings of Mock-Ups: Provide large scale shop drawings for fabrication, installation and erection of all parts of each mock-up. Provide plans, elevations, and details of anchorage, connections and accessory items.

C. Photographs of Mock-Ups: Submit photographs of mock-ups after completion of installation and acceptance of each mock-up.

D. Submittal Samples: Refer to individual Specification Sections for submittal requirements of mock-up components and coordinate accordingly.

1.6 QUALITY ASSURANCE

A. Design Modifications: Make design modifications to Mock-Up work only as required to meet performance requirements and to coordinate the work.

B. Indicate proposed design modifications on shop drawings. Maintain original design concept without altering profiles and alignments indicated.
C. Clearly identify all Design Modifications incorporated into the Mock-Ups. If no Design Modification is called to the attention of the Architect, the Architect will conclude that the Mock-Up exactly reflects the Design Documents.

D. Obtain the specific acceptance from the Architect for all Design Modifications

PART 2 – PRODUCTS

2.1 MATERIALS AND PRODUCTS

A. Provide materials, components, and products for Mock-Ups as specified in individual Specification Sections.

PART 3 – EXECUTION

3.1 GENERAL

A. Refer to PART 3, EXECUTION portions of the various Specification Sections for specific requirements regarding condition of surfaces, erection, and erection tolerances.

3.2 MOCK-UP QUANTITY, LOCATION, ACCEPTANCE

A. Provide Mock-Ups of types and sizes indicated in the Drawings to evaluate and set the standard of quality for that work.

B. Obtain Architect's acceptance of visual qualities prior to commencing work that individual Mock-Up is intended to represent.

C. Protect and maintain approved Mock-Ups throughout the work of the Contract.

D. Locate Mock-Ups as shown on the Drawings.
   1. Provide as many mock-ups as required until Architect's approval has been received.
   2. In-Place Mock-Ups, approved Mock-Ups may be incorporated into the finish work.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. This section specifies procedures for measuring and reporting the quality and performance of construction, including:
   1. Code required and specification required tests and inspections performed by independent agencies employed by the Owner and Managed by the Architect
   2. Code required and specified tests and inspections provided by the General Contractor or by an independent testing agency employed and managed by the General Contractor regardless of whether the tests are code required, specified or undertaken at the option of the General Contractor.
   3. Testing related responsibilities of the General Contractor.
   5. Establishment of Bench Marks for workmanship; performance of materials, assemblies and equipment.
   5. Management of Field Observation Reports (Field Reports, Exceptions, Rolling Punchlist, Deficiencies and Notice Of Deficiency (NOD).

1.2 SUBMITTALS

A. Test Reports:
   1. For tests and inspections which are paid for by the Owner and managed by the Architect, certified written reports will be forwarded from the inspecting agency to the Architect for Distribution to the Owner and General Contractor. Such reports will be incorporated into the Architects Field Observation Reports and sent to local authorities.
   2. For code required and specified tests and inspections which are paid for by and managed by the General Contractor, certified written reports will be forwarded from the inspecting agency to the General Contractor for Distribution to the Owner and Architect. Such reports will be incorporated into the Architects Field Observation Reports and sent to local authorities.
   3. For tests and inspections which are paid for and performed at the option of the General Contractor, written reports certified or otherwise may be distributed to the Owner and Architect at the sole discretion of the General Contractor.
1.3 TESTING BY OWNER

A. Where inspections, tests, and other requirements of the Contract Documents are specifically indicated to be the Owner's responsibility, the Owner will employ and pay a qualified independent testing agency to perform those services.
   1. The Owner may delegate to the Architect the responsibility for hiring the testing agency, however the Owner will pay the cost for the qualified independent testing agency.

1.4 TESTING BY THE GENERAL CONTRACTOR

A. Scope of Testing Performed by General Contractor: The General Contractor shall provide all other inspections, tests, and other quality control services specified elsewhere in the Contract Documents or required by authorities having jurisdiction.

B. Include costs for these services in the Contract Sum.
   1. Unless the Contract Documents or local authorities permit such testing or inspections to be performed by the General Contractor's own forces, the General Contractor shall employ and pay a qualified independent testing agency or agencies to perform these services. This agency shall be referred to as "the Contractor's Testing Agency" or "the Contractor's Testing and Inspection Agency".

1.5 GENERAL CONTRACTOR'S RESPONSIBILITIES FOR ALL TESTING

A. Regardless of whether testing and inspection is performed by the Owner's Testing and Inspection Agency or the General Contractor's Testing and Inspection Agency, the General Contractor shall be responsible for coordination and scheduling of testing, and for associated services, as follows:
   1. Schedule times for inspections, tests, taking samples, and similar activities. Coordinate this schedule with construction activities so that testing does not delay the work and so that testing is completed before work to be tested is closed in or otherwise made inaccessible. Provide and include in the cost of the work all Associated Services.
   2. When the Owner delegates the management of the Owner's Testing to the Architect, coordinate and cooperate with the Architect with needed scheduling, access and Associated Services as described below. Include in the cost of the work all Associated Services.
   3. Associated Services: Cooperate with agencies performing required inspections, tests, and similar services, and provide reasonable support services as requested. Notify the agency sufficiently in advance of
operations to permit assignment of personnel. Auxiliary services may include, but are not limited to, the following:

a. Provide access to the Work.
b. Furnish incidental labor and facilities necessary to facilitate inspections and tests.
c. Take adequate quantities of representative samples of materials that require testing or assist the agency in taking samples.
d. Provide facilities for storage and curing of test samples.
e. Deliver samples to testing laboratories.
f. Provide the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.
g. Provide security and protection of samples and test equipment at the Project Site.
h. Protect construction exposed by or for quality-control service activities.

B. Retesting: The General Contractor is responsible for the costs of and all coordination of retesting where results of inspections, tests, or other quality-control services prove unsatisfactory and indicate noncompliance with Contract Documents, regardless of whether or not the original test was Contractor's responsibility.

C. Do not cover or enclose with permanent construction items or assemblies which are to be tested or inspected until such testing or inspection has been completed and the Work has been accepted in accordance with the Contract Documents.
   1. Protect construction exposed by or for testing and inspection until it is covered or enclosed with permanent construction.
   2. After inspection and testing is completed, complete the enclosing Work and repair substrates and finishes that have been damaged by the testing.

D. Upon completion of inspection, testing, sample taking and similar services, repair damaged construction and restore substrates and finishes. Comply with requirements for cutting and patching specified in Section 01 73 29, "Cutting and Patching".

1.6 TESTING AGENCY’S RESPONSIBILITIES FOR ALL TESTING

A. Duties of the Testing Agency:
   1. Provide qualified personnel to perform required inspections and tests.
2. Furnish equipment, tools and supplies necessary for taking samples and performing tests, except where sampling is indicated to be the responsibility of the General Contractor.

3. Prepare test reports, as specified elsewhere in this Section.

4. Promptly notify the Architect and the General Contractor of irregularities or deficiencies observed in the Work during performance of its services.

B. The agency is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the Work.

C. Promptly after completion of each inspection or test performed, the testing agency shall prepare a certified written report of the tests or inspections performed. Submittal of such reports shall be a prerequisite to payment for the work being tested.

D. Report Data: Include as a minimum, the following information:
   1. Date of issue.
   2. Project title and number.
   3. Name, address, and telephone number of testing agency.
   4. Name of individual making the inspection or test. Have this person sign the report after it is completed.
   5. Identification of product or assembly and Specification Section.
   6. Dates and locations of samples and tests or inspections.
   7. Ambient conditions at the time of sample taking and testing.
   8. Description of the type of inspection or test method.
   9. Complete inspection or test data.
   10. An interpretation of test results, including comments or professional opinion on whether inspected or tested Work complies with the Contract Documents.
   11. Recommendation for remedial action or retesting.

E. Submittal:
   1. If the Testing Agency is performing the testing for the Owner, the Testing Agency shall deliver reports to the Architect as follows
      a. If paper, three (3) copies, plus additional copies as requested by the Architect for special distribution. The Architect will forward paper copies of the test reports to the Owner, General Contractor and the local authority having jurisdiction.
      b. If electronic, forward PDF file to the Architect. The Architect will forward electronic copies of the test reports to the Owner, General Contractor and the local authority having jurisdiction.
   2. If the Testing Agency is performing the code or specification required testing for the General Contractor, the Testing Agency shall deliver reports to the General Contractor as follows
If paper, three (3) copies, plus additional copies as requested by the General Contractor for distribution. The General Contractor will forward paper copies of the test reports to the Architect, Owner and the local authority having jurisdiction, if required.

b. If electronic, forward PDF file to the General Contractor. The General Contractor will forward electronic copies of the test reports to the Architect and the Owner. The Architect will forward electronic copies of the test reports to the local authority having jurisdiction.

3. If the Testing Agency is performing optional testing for the General Contractor, the Testing Agency shall deliver reports to the General Contractor as follows
   a. If paper, three (3) copies, plus additional copies as requested by the General Contractor. Further distribution is at the General Contractor’s option.
   b. If electronic, forward PDF file to the General Contractor. Further distribution is at the General Contractor’s option.

1.7 FIELD SAMPLES

A. Field Samples:
   1. Retain and maintain approved Field Samples during construction in undisturbed condition as standard for judging completed construction.
   2. Field Samples are to be accessible to Sub-Contractors and field crew to insure that the installed work is consistent with prior approvals.
   3. Retain Field Samples until directed otherwise by the Architect.
   4. In the absence of direction, return field samples to the Architect

1.8 BENCHMARKS

A. Benchmarks:
   1. Benchmarks are used by the Contractor, Architect and Owner to verify compliance of the Work to the Contract Documents.
   2. They are established by standards, samples, and submittal as part of the Work prior to installation of the related work.
   3. Prior to installation of a major component of the Work, and/or as called for in the Specifications, the Contractor, Architect and Owner shall discuss and agree what components are to be “benchmarks”.

END OF SECTION
PART 1 – GENERAL

1.1 SUMMARY

A. Furnish and install temporary services and facilities, including utilities, construction and support facilities, security and protection required for the Work.

B. Construction facilities and temporary controls which may be required for this Project include, but are not limited to:
   1. Fire protection during construction.
   2. Field offices and sheds.
   3. Use of permanent elevators and stairs.
   4. Temporary protection of building construction.
   5. Temporary partitions
   6. Environmental controls during construction.
   7. Temporary barriers, safety devices and signs.

1.2 REFERENCED STANDARDS

A. National Fire Protection Association (NFPA):
   1. NFPA 10, Standard for Portable Fire Extinguishers.
   2. NFPA 70, National Electrical Code.

1.3 QUALITY ASSURANCE

A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction, including but not limited to:
   1. State Building Code requirements.
   2. Health and safety regulations.
   3. Utility company regulations.
   4. Police, Fire Department and Rescue Squad rules.
   5. Environmental protection regulations.
   6. The State Electrical Code, referred to in this section as the “Electrical Code.”
   7. Massachusetts Criminal Offense Record Information (CORI).

B. Superintendence: Contractor’s superintendent shall be on site from the beginning of the Work, prior to placing or erecting temporary construction specified in this Section.
C. Standards: Contractor shall be responsible for identifying and complying with applicable standards and guidelines for safe construction of the Work.

D. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.4 JOB SITE CONDITIONS

A. Existing Access Roads and Parking Areas: Do not obstruct existing driveways, roads, and parking on the site that are used by the Owner or Owner's personnel, unless otherwise approved by the Owner.

1.5 SEQUENCING AND SCHEDULING

A. Install or initiate temporary services in a timely fashion, when they are needed, so that the progress of the work is not delayed.

B. Maintain temporary facilities until the time of Substantial Completion, or until they are no longer required.

PART 2 – PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. The Contractor shall be responsible for selecting suitable materials and equipment that meet applicable codes and regulations.

B. Fire Extinguishers: Provide hand-carried, portable UL-rated fire extinguishers conforming to NFPA recommendations. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent and size required by location and class of fire exposure, and location of fire extinguishers.

C. Tarpaulins: Use only fire-retardant tarpaulins.

PART 3 - EXECUTION

3.1 FIRE PROTECTION DURING CONSTRUCTION

A. Applicable Standards: Comply with NFPA 10 and NFPA 241.

B. Temporary Fire Protection:
   1. Provide and maintain temporary fire protection devices while any work of this Project is underway.
   2. As a minimum, provide portable fire extinguishers.
3. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.

C. Precaution: Institute controls to minimize or eliminate risk of fires. As a minimum:
   1. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for fighting fires.
   2. Prohibit smoking on the Project site.
   3. Store combustible materials in containers in fire-safe locations.
   4. Supervise torching and welding operations to prevent accidental ignition.
   5. Supervise installations which involve flammable materials or processes capable of starting combustion.
   6. Supervise combustion type temporary heating units.
   7. Keep the area within the limits of the Project orderly and clean and promptly remove combustible rubbish from the site.

D. Comply with all reasonable recommendations regarding fire protection made by the representative of the fire insurance company carrying insurance on the Work or by the local fire chief or fire marshal.

E. Fire Watch: Maintain a fire watch of the interior and exterior of the facility for at least one hour after the following activities have ceased for the day: torching, welding, installation of epoxy flooring, or other activities capable of starting combustion.

F. Permanent Fire Protection: At the earliest feasible date in each area of the Project, complete installation of the permanent fire protection system, and place into operation. Make sure key personnel understand how the system operates.
   1. If it is necessary thereafter to disable the permanent system for short periods of time, provide temporary protection of type acceptable to Owner’s insurer and to the local fire department while the permanent system is inoperative.

3.2 FIELD OFFICES

A. Contractor’s/Owner’s/Architect’s Field Offices: Provide insulated, weather-tight temporary offices which are appropriately heated and cooled, suitably furnished and equipped, as agreed upon with the Owner and the Architect, of sufficient size to accommodate required office personnel at the Project site. Keep the office clean and orderly.

B. Storage and Fabrication Enclosures: Provide as required for Contractor’s own work. Enclosures shall be fabricated of non-combustible or fire-resistant materials and shall comply with NFPA 241.
3.3 USE OF PERMANENT LIFTS

A. Temporary Use of Permanent Lifts: Do not use Owner’s Elevators or Lifts for construction purposes, unless allowed by Owner. Provide padded wall protection and floor covering to protect interior of elevator cab surfaces.

3.4 TEMPORARY PROTECTION OF BUILDING CONSTRUCTION

A. Protect the Work and other existing conditions against damage from normal day-to-day construction activities including, without limitation, movement of materials and personnel, traffic of all kinds, weather hazards, spillages and other reasonably foreseeable danger.
   1. Specific protections (masking or covering, for example) are specified in the Section covering the trade doing the work. However, the Contractor shall be responsible for protecting the Work and other existing conditions against general hazards.
   2. Typical Situations: Without limiting the generality of this Article, protect the Work against the following hazards and abuses:

B. Protect window and door jambs from damage resulting from collision.

C. Protect finished floors against traffic soiling.

D. Protect walls and floors scheduled to receive subsequent finishes from soiling that would impair the adhesion of those finishes.

E. Protect installed glass against breakage.

F. Protect stored materials against weather damage.

3.5 TEMPORARY PARTITIONS

A. Temporary Partitions: When performing work in or directly adjacent to an occupied area, erect temporary partitions with locking doors to separate the construction area from areas of the area(s) which are occupied and in use. The intent is to contain dust and debris generated by demolition and construction, and also to secure the project area(s) both during work and when work is not in progress. Locate partitions at locations shown on the drawings; or if not shown, at location agreed upon with the Owner.
   1. Finish side of temporary partitions exposed to view in occupied areas with a layer of gypsum board and a coat of paint as agreed to with the Architect.
3.6 ENVIRONMENTAL CONTROLS

A. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result.

B. Consistent with safe and reasonable construction practices, employ equipment, machinery and techniques of a kind which will minimize detrimental impact on the environment. Avoid excessive noise, unnecessary air pollution from dust, demolition, machinery exhaust, and the use of sprayed-on materials. Do not employ open burning on the construction site. Dispose of waste material only at authorized disposal sites. Refer to Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT.

C. Air-Borne Dust Control: Provide adequate means for containing dust caused by construction operations. Wet down demolition debris and cover dumpsters with tarps, if necessary to prevent dust and debris from blowing around.

D. Noise Control: Comply with local city or town bylaws limiting hours of construction.

E. "There shall be no smoking on the Project property."

3.7 TEMPORARY BARRIERS, SAFETY DEVICES, AND SIGNS

A. Security Enclosure and Lockup: Secure partially completed areas of construction to prevent unauthorized entrance, vandalism, and theft.
   1. Storage: Provide a secure lock-up for materials and equipment which are of significant value or attractive for theft.
   2. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.

B. Barricades, Warning Signs: Provide as required to warn and keep people away from hazards on the site. Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics and warning signs to inform personnel and the public of the hazard being protected against.
   1. Where required, illuminate barricades and warning signs with appropriate lighting.

C. Informational Signs: Post signs as required to provide directional information to construction personnel and visitors. Construct signs in an attractive manner, of materials and of a size acceptable to the Architect.

D. Temporary Exit Signs: Post and maintain temporary exit signs at all firewalls and all other active egress doors in accordance with authorities having jurisdiction until permanent signs are installed and functioning.
3.8 CONSTRUCTION SIGN

A. Nominal Size: 4’ x 8’.

B. Material: Exterior signage grade ¾” plywood or other similar panel material which will possesses similar weather resistance and structural integrity.

C. Colors and images: Provide for full color signage of both text and City of New Bedford seal.

D. Text and Detail: Architect will provide text and detail to the Contractor immediately after execution of the Owner-Contractor Agreement.

E. Location and installation: Details of location and installation will be mutually agreed upon by the Owner, Architect and Contractor.

F. Sign Installation and Removal Schedule:
   1. The Construction Sign shall be in place prior to the commencement of work on the site.
   2. The Construction Sign shall be removed immediately prior to Final Completion.
   3. If required by Owner or the progress of the work, the Contractor shall relocate the sign as required or as directed by the Owner in coordination with the Architect.

3.9 USE OF DUMPSTERS

A. Dumpsters: Prior to providing dumpsters on-site for construction waste, obtain written approval of Owner for location of all dumpsters.

3.10 TERMINATION AND REPAIR

A. Termination and Removal: Remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion.

B. Repair or replace Work damaged by installation and removal of temporary facilities. Comply with requirements of 01 73 29 “CUTTING AND PATCHING”.

C. Repair public right-of-way where disturbed by construction or removal of temporary facilities, including paving, plantings, and improvements, in accordance with the standards and requirements of authorities having jurisdiction, as applicable, and leave public property in as good condition after completion as before operations started.

END OF SECTION

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TEMPORARY FACILITIES AND CONTROLS
Page 6 of 6
01 51 50
CONSTRUCTION INDOOR AIR QUALITY (IAQ) MANAGEMENT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be include in and made a part of this Section.

1.2 WORK INCLUDED

A. Requirements for minimum indoor air quality (IAQ) performance standards during the construction period.

B. The General Contractor shall develop, for Owner and Architect review, a Construction Indoor Air Quality Management Plan for this Project.

1.3 RELATED WORK

A. Examine Contract Documents for requirements that affect the work of this Section. Other Specification Sections that relate directly to work of this Section include, but are not limited to:

1. Section 01 32 60 - EXCEPTIONS
2. Section 01 33 00 - SUBMITTAL PROCEDURES; Submittal requirements.
3. Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.
4. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT.
5. Section 01 74 00 - PROGRESS AND FINAL CLEANING

1.4 PERFORMANCE REQUIREMENTS


B. Prevent exposure of building systems to environmental tobacco smoke during construction. At a minimum, take the following measures:

1. Do not allow on the project site.
2. Do not allow smoking adjacent to fresh air intakes for the building.

C. Comply with requirements of Sheet Metal and Air Conditioning National Contractors Association (SMACNA) “IAQ Guideline for Occupied Buildings under Construction”.

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CONSTRUCTION INDOOR AIR QUALITY (IAQ) MANAGEMENT
Page 1 of 3
1.5 CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT PLAN


B. Within seven (7) calendar days after receipt of Notice to Proceed, the Contractor shall submit to the Architect and the Owner a finalized Construction IAQ Management Plan. The proposed Plan shall include, but not be limited to, the following:
   1. Protection of ventilation system components during construction.
   2. Cleaning and replacing contaminated ventilation system components after construction.
   3. Temporary ventilation.
   4. Environmental isolation and protection of occupants and the occupied portions of the building.
   5. Coordination with the Owner retained Industrial Hygienist.
   6. Procedures for clearing areas affected by remediation and window removal.
   7. Coordination of IAQ during progress and Final cleaning procedures.

C. Work which involves remediation and/or window removal shall not begin until an accepted Construction Indoor Air Quality Management Plan is in place.

D. Failure to submit a Construction Indoor Air Quality Management Plan in a timely manner will be cause for the Architect to issue an NOD. (See Section 01 32 60 – EXCEPTIONS.)

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 CONSTRUCTION IAQ MANAGEMENT PLAN IMPLEMENTATION

A. IAQ Manager: The General Contractor shall designate an on-site person responsible for instructing workers and overseeing and documenting results of the Construction IAQ Management Plan for the Project.
   a. This on-site person shall coordinate with the Owner’s on-site Industrial Hygienist.

B. Distribution: The General Contractor shall distribute copies of the Construction IAQ Management Plan to the Job Site Foreman, each Sub-contractor, the Owner, and the Architect.
C. Instruction: The General Contractor shall provide on-site instruction of appropriate procedures and methods to be used by all parties at the appropriate stages of the Project.

D. Coordinate Construction IAQ Management Plan with final cleaning as indicated in Section 01 77 30, PROJECT CLOSEOUT / FINAL COMPLETION.

END OF SECTION
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for materials and equipment used for the Project.

1.3 RELATED REQUIREMENTS

A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

1. Section 01 11 00 - SUMMARY OF WORK.
2. Section 01 35 00 - SUBMITTALS.
3. Section 01 77 20 - SUBSTANTIAL COMPLETION.
4. Section 01 77 30 - PROJECT CLOSEOUT AND FINAL COMPLETION.

1.4 PRODUCTS

A. Products include material, equipment, and systems.

B. Comply with Specifications and referenced standards as minimum requirements.

C. Components required to be supplied in quantity within a Specification Section shall be the same, and shall be interchangeable.

D. Do not use materials and equipment removed from existing structures, except as specifically required, or allowed, by the Contract Documents.

E. In the case of an inconsistency between Drawings and the Project Manual, or within either document which is not clarified by addendum, the product of greater quality or greater quantity of work shall be provided in accordance with the Architect's interpretation.
1.5 WORKMANSHIP

A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.

B. Perform work by persons qualified to produce workmanship of specified quality.

1.6 MANUFACTURERS' INSTRUCTIONS

A. When work is specified to comply with manufacturers' instructions, submit copies as specified in Section 01 35 00, SUBMITTAL PROCEDURES, distribute copies to persons involved, and maintain one set in field office.

B. Perform work in accordance with details of instructions and specified requirements.

1.7 TRANSPORTATION AND HANDLING

A. Refer to Document 00 72 01 GENERAL CONDITIONS OF THE CONTRACT and Specifications Sections for requirements pertaining to transportation and handling of materials and equipment.

B. Transport products by methods to avoid product damage; deliver in undamaged condition in manufacturers' unopened containers or packaging, dryContext:

C. Provide equipment and personnel to handle products by methods to prevent soiling or damage.

D. Promptly inspect shipments to assure that products comply with requirements, that quantities are correct, and products are undamaged.

1.8 STORAGE AND PROTECTION

A. Refer to Document 00 72 01 GENERAL CONDITIONS OF THE CONTRACT and Specifications Sections for requirements pertaining to storage and protection of materials and equipment.

B. Store products in accordance with manufacturers' instruction, with seals and labels intact and legible. Store sensitive products in weather tight enclosures; maintain within temperature and humidity ranges required by manufacturers' instructions.

C. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.
D. Arrange storage to provide access for inspection. Periodically inspect to assure that products are undamaged, and are maintained under required conditions.

E. General Contractor shall protect all loose and installed materials from damage until final acceptance of the Project.

1.9 PRODUCT STANDARDS

A. Any product specified by reference to the number, symbol, or title of a standard, such as Commercial Standard, a Federal Specification, an ASTM Standard, an ANSI Standard, a trade association standard, or other similar standard, shall comply with the requirements of the latest issue of such standard or revision thereof, including any amendment or supplement thereto, as listed in the latest official index in effect as of the bid date.

B. The standards referred to, except as modified in the Specifications, shall have full force and effect as though printed in the Specifications. The Architect will furnish, upon request, information as to how copies of the standards referred to may be obtained.

C. All manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned, in accordance with the manufacturer's printed instructions, unless otherwise specified.

1.10 SUBSTITUTIONS OF SPECIFIED PRODUCTS AND SYSTEMS

A. Substitutions of specified products and systems shall comply with requirements of Chapter 30, Section 39M of General Laws, and additional requirements and procedures specified herein.

B. The Contract Documents are intended to produce a building of consistent character and quality of design. All components of the building including visible materials and equipment have been selected to have a coordinated design in relation to the overall appearance of the building. The Architect will judge the design, functionality, and appearance of proposed substitutes on the basis of their suitability in relation to the overall design of the project, as well as for their intrinsic merits. The Architect will not approve, as equal to materials specified, proposed substitutes which, in the Architect's opinion, would be out of character, obtrusive, or otherwise inconsistent with the character or quality of design of the Work. With respect to exterior finishes value or effect, the Architect may not approve as equal any proposed substitute which, in the Architect's sole opinion, would not produce the same artistic or aesthetic value or effect. In order to permit coordinated design of color and finishes the General Contractor shall, if required by the Architect, furnish the substituted material in any color, finish, texture, or pattern which would have been available from the manufacturer originally specified, at no additional cost to the Owner.
C. Specific reference in the Specification to any product, material, or process by name, make, or catalog number shall be interpreted as establishing a standard of quality. An item will be considered equal to the item so named or described if (1) it is at least equal in quality, durability, appearance, strength and design; (2) it will perform at least equally the function imposed by the general design for the work; and (3) it conforms substantially, even with deviations to the detailed requirements for the item in the Specification. [M.G.L. Chapter 30, Section 39M (b).] The Architect shall be the sole judge of whether and proposed substitute product, material, process, or method is equal to that specified according to this standard, and his decision shall be final and binding on the General Contractor and any Subcontractor or Sub-Subcontractor.

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

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

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

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION
PART 1 – GENERAL

1.1 SUMMARY

A. This section specifies general requirements for selecting products.

B. Related Work:
   1. Review of submittals: Section 01 33 00, "SUBMITTAL PROCEDURES".
   2. Definition of "Referenced Standards": Section 01 41 00, "QUALITY ASSURANCE".

1.2 PRODUCT OPTIONS

A. For products specified only by reference standard, select any product meeting that standard.

B. For products specified by description of physical properties or performance, submit a product meeting the specified requirements. Provide sufficient documentation of performance testing to demonstrate compliance with the requirements to the satisfaction of the Architect.

C. For products specified by naming an acceptable product as an example, submit that product or another product matching the performance and characteristics of the named product. Provide sufficient documentation of performance testing to demonstrate compliance with the requirements to the satisfaction of the Architect.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. This section specifies general requirements for delivering, storing, and handling materials, including Owner-furnished materials.

1.2 PRODUCT DELIVERY

A. Require manufactured materials to be delivered in manufacturer’s original packaging, with labels clearly indicating the contents and special handling and safety requirements. On labels, show product names, model numbers, types, grades, compliance, and other information needed for identification.

B. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.

1.3 PRODUCT STORAGE

A. Store materials safely on the site and protect them from weather, water and from other damage. Comply with manufacturer’s instructions with regard to acceptable temperature and humidity conditions so that materials will not deteriorate or age excessively while in storage.

B. Generally, for materials stored outdoors (except for landscaping materials), store materials off the ground on pallets and cover them in a way that protects them from rain and snow but allows air to circulate.

C. Store items which are vulnerable to damage from impact, dirt, dust, and rough-handling – such as equipment with moving parts, valves, controls, finish hardware and items with easily damaged finishes - in original packaging until just prior to installation. Leave protective coatings on finished items until just prior to Substantial Completion, unless directed by the Architect to remove the protection.

D. Deliver to storage location on-site as directed by Owner.

E. Contractor shall maintain Material Safety Data Sheets (MSDS) for hazardous materials used and/or stored on-site during construction.
1.4 EXTRA MATERIALS AND MAINTENANCE MATERIALS

A. Furnish extra materials, maintenance materials, spare parts and supplies required by the various sections, neatly packaged with protective covering for storage and identified with labels clearly describing contents and application or location where item is installed.

B. Deliver to storage location on-site as directed by Owner.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for cutting, fitting, and patching work required to complete the Work or to:
   1. Make its several parts fit together properly.
   2. Uncover portions of the Work to provide for installations of ill-timed work.
   3. Remove and replace defective work.
   4. Remove and replace work not conforming to requirements of Contract Documents.

B. Subcontractors shall cut existing construction, under the direction of the General Contractor, to provide for installation of components required by their respective trades or performance of other construction activities required by their trade and the subsequent fitting and patching required to restore surfaces to their original condition. In instances of conflicts of trades the General Contractor shall coordinate proper control of cutting by the trades and be responsible for unnecessary over cutting or damage caused by improper cutting and or patching.

1.3 RELATED REQUIREMENTS

A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
   1. Section 01 11 00 - SUMMARY OF WORK.
   2. Section 01 35 16 - ALTERATION PROJECT PROCEDURES
   3. Section 02 41 19 - SELECTIVE DEMOLITION.

1.4 QUALITY ASSURANCE

A. Permission to patch any items of work does not imply a waiver of the Architect’s right to require complete removal and replacement in said areas and of said items if, in Architect’s opinion, patching does not satisfactorily restore quality and appearance of work.
B. Requirements for Structural Work: Do not cut-and-patch structural work in a manner resulting in a reduction of load-carrying capacity or load/deflection ratio.

C. Operational and Safety Limitations: Do not cut-and-patch operational elements and safety-related components in a manner resulting in a reduction of capacities to perform in the manner intended or resulting in decreased operational life, increased maintenance, or decreased safety.

D. Visual Requirements: Do not cut-and-patch work that is exposed on exterior or in occupied spaces of building, in a manner resulting in reduction of visual qualities or resulting in substantial evidence of cut-and-patch work, both as judged solely by the Architect. Remove and replace work judged by the Architect to be visually unsatisfactory.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Except as otherwise indicated or authorized by the Architect, provide materials for cutting-and-patching which will result in equal-or-better work than the work being cut-and-patched, in terms of performance characteristics and including visual effect where applicable.

B. Comply with the requirements, and use materials identical with the original materials where feasible and where recognized that satisfactory results can be produced thereby.

C. Comply with specifications and standards for each specific product involved.

PART 3 - EXECUTION

3.1 INSPECTION

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

B. After uncovering work, inspect conditions affecting installation of Products, or performance of work.

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

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

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

C. Provide protection from elements for that portion of the Project which may be exposed by cutting and patching work.

3.3 PERFORMANCE

A. Execute cutting and demolition by methods which will prevent damage to other work, and will provide proper surfaces to receive installation of repairs.

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

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

D. Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work.

E. Restore exposed finishes of patched areas; and, where necessary extend finish restoration onto retained work adjoining, in a manner which will eliminate evidence of patching.

F. 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 entire unit.

END OF SECTION
01 74 00
PROGRESS, FINAL CLEANING AND POST PUNCH LIST REPAIR CLEANING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.2 SUMMARY

A. This Section specifies cleaning requirements for work of this Project. Included are the following:

1. Progress cleaning requirements during construction.
2. Final cleaning by professional cleaners prior to Substantial Completion.
3. Post punch list repair cleaning

1.3 RELATED REQUIREMENTS

A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

1. Section 00 72 01 - GENERAL CONDITIONS OF THE CONTRACT, GENERAL CONDITIONS
2. Section 01 11 00 - SUMMARY OF WORK; Owner occupancy.
3. Section 01 77 20 - “SUBSTANTIAL COMPLETION” and Section 01 77 30 “PROJECT CLOSEOUT AND FINAL COMPLETION”; other than Progress and Final Cleaning.
4. Respective Sections of Specifications: Closeout Submittals for work of the Section.

1.4 SUBMITTALS

A. Product Data: For each type of cleaning product indicated. Include recommendations for application and use. Include test data substantiating that products comply with requirements. Provide MSDS for each product.

B. Qualification Data: For professional cleaners to be engaged for final cleaning including qualifications of field supervisors and references for similar projects.
PART 2 - PRODUCTS

2.1 CLEANING MATERIALS

A. General: Provide cleaning materials that will not create hazards to health nor property, and will not damage surfaces or finishes.

B. Use cleaning materials and methods recommended by manufacturer of surface to be cleaned.

C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.01 PROGRESS CLEANING

A. This Article refers to regular cleaning operations conducted while construction is in progress. Requirements for final cleaning before Substantial Completion are included under Article 3.2.

B. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.

C. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.

D. Do not hold waste materials in approved receptacles more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80°F.

E. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

F. Site: Maintain Project site free of waste materials and debris.

G. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

H. Remove liquid spills promptly.

I. Where dust will impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
J. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

K. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

L. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

M. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

N. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

O. Limiting Exposures: Supervise construction operations to assure that no part of the construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

P. Clean Project site, yards, grounds and public ways daily to remove construction related rubbish, waste material, litter, and other foreign substances.

Q. Maintain toilet facilities used by construction personnel daily. Restock paper goods. Wash down all fixtures and sanitize. Empty waste receptacles, polish mirrors, clean and sanitize all contact surfaces including doors and hardware.

3.2 FINAL CLEANING

A. General: Provide final cleaning by professional cleaners. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project in advance of Owner’s move-in of furnishings and equipment.

   a. Clean Project site, yard, and grounds, in areas disturbed by construction activities including landscape areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.

c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.

d. Remove tools, construction equipment, machinery, and surplus material from Project site.

e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.

g. Sweep concrete floors broom clean in unoccupied spaces.

h. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.

i. Clean glass. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.

j. Remove labels that are not permanent.

k. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

m. Replace parts subject to unusual operating conditions.

n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

2. Leave Project clean and ready for occupancy.

3. Evaluation of cleaning will be part of Punchlist review.

3.3 CLEANING AFTER PUNCH LIST REPAIR WORK

A. Provide cleaning after punch list repair work by professional cleaners to provide same level of cleaning as Final Cleaning per paragraph 3.2 above.

END OF SECTION
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 – GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.2 SUMMARY

A. This Section specifies requirements for the Contractor’s implementation of waste management controls and systems for the duration of the Work.

B. Related Sections include the following:
   1. Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

1.3 INTENT

A. This Section specifies requirements for the General Contractor’s implementation of waste management controls and systems for the duration of the Work.

B. It has been established that this Project shall generate the least amount of waste practical and that processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors shall be employed.

C. Of the waste that is generated, as many of the waste materials as economically feasible shall be reused, salvaged, or recycled. Waste disposal in landfills shall be minimized to the greatest extent practical.

D. The General Contractor shall develop a Waste Management Plan for this Project.

E. Each subcontractor shall be responsible for segregating their own waste as directed by the General Contractor.

F. The General Contractor shall be responsible for ensuring that debris will be disposed of at appropriately designated licensed solid waste disposal facilities.

1.4 WASTE MANAGEMENT PLAN:

A. Waste Management Plan:
1. Within 10 calendar days after receipt of Notice to Proceed, the General Contractor shall provide a plan containing the following:
   a. Analysis of the proposed jobsite waste to be generated, including types and rough quantities.
   b. Landfill Options:
      i. The name of the landfills where trash and building debris will be disposed of, the applicable landfill tipping fees, and the projected cost of disposing of all Project waste in the landfills.
   c. Landfill Certification:
      i. General Contractor’s statement of verification that landfills proposed for use are licensed for types of waste to be deposited and have sufficient capacity to receive waste from this project.
   d. Alternatives to Disposal at Landfill:
      i. A list of each material proposed to be salvaged or recycled during the course of the Project.
      ii. Include the following and any additional items proposed:
         • Cardboard.
         • Clean dimensional wood.
         • Beverage containers.
         • Concrete.
         • Gypsum Board
         • Asphalt.
         • Metals from framing, banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass and bronze.
         • Mechanical and electrical equipment.
         • Building components which can be removed relatively intact from existing construction.
   e. Meetings:
      i. A description of the regular meetings to be held to address waste management.
   f. Materials Handling Procedures:
      i. A description of the means by which any waste materials identified above will be protected from contamination, and a description of the means to be employed in recycling the above materials consistent with requirements for acceptance by designated facilities.
   g. Transportation: A description of the means of transportation of the recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site) and destination of materials.
B. Summary Report:
1. Prior to Substantial Completion, the Contractor shall submit a written Waste Management Report summarizing the types and quantities of materials recycled and disposed of under the Waste Management Plan.
2. Also include the name and location of disposal facilities.

C. Recycling
1. Refer to the Massachusetts Recycling Directory available at the Massachusetts State Bookstore (617-727-2834) in the State Capital Building for recycling operations within the State.
2. Metal, including but not limited to aluminum, steel, and reinforcing steel shall be recycled.
3. Wood that is not painted and does not contain preservatives (i.e. creosote, arsenic, and chromium-containing preservatives) shall be segregated and recycled.

1.5 WASTE MANAGEMENT PLAN IMPLEMENTATION:

A. Manager:
1. The General Contractor shall designate an on-site person responsible for instructing workers and overseeing and documenting results of the Waste Management Plan for the Project.

B. Distribution:
1. The General Contractor shall distribute copies of the Waste Management Plan to the Job Site Foreman, each subcontractor, the Owner and the Architect.

C. Instruction:
1. The General Contractor shall provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the Project.

D. Separation Facilities:
1. The General Contractor shall layout and label a specific area to facilitate separation of materials for recycling, salvage, reuse, and return. Recycling and waste bin areas are to be kept neat and clean and clearly marked in order to avoid contamination of materials.
2. Location of separation areas shall be acceptable to the Owner.

END OF SECTION
PART 1 - GENERAL

1.1 WORK INCLUDES

A. General: This Section specifies administrative requirements and construction procedures to be employed by all project personnel working on or adjacent to installed roofing in order to protect the existing roof from damage as a result of construction operations and to maintain existing roof warranties.

1. The term ‘Installed Roofing’ as used herein shall mean any or all of the following:
   a. Pre-existing roofing, in place prior to the start of this project
   b. Newly installed roofing and flashing that is placed as part of this project and located where new work of the project must be performed
   c. Where new roofing and existing roofing is integrated.

2. The means and methods chosen by the General Contractor and sub-contractor are to be detailed and summarized in an enforceable “Roof Protection Program” which shall be presented in a “Roof Protection Method Statement” and submitted to Architect for review and approval.
   a. The “Roof Protection Method Statement” shall include a copy of the initial roof condition evaluation.
   b. The approval of the “Roof Protection Method Statement” is a required prerequisite prior to the processing of the first Requisition for Payment by the Architect.
   c. Provide a minimum of two weeks for review of the “Roof Protection Method Statement” prior to submission of the first Requisition for Payment.

B. Scope: Requirements specified in this Section include the following:
   1. Documentation of the existing roof condition.
   2. Protection requirements for all traffic on roof.
   3. Requirements to maintain roof warranties.

C. The General Contractor to prepare and enforce a program for protection of installed roofing during construction operations for the duration of the Project. In addition to the detailed requirements identified in Division 7, the General Contractor shall submit to the Architect the following:
   1. At the completion of the Work the Contractor shall certify that all pre-existing warranties (if any) remain intact.

D. Existing Roof System: Prior to the start of any work on or above an existing roof, the Contractor shall obtain from the Owner and submit to the Architect the following is data
on the existing roofing; unless otherwise indicated, it is the responsibility of the General Contractor to verify it and ensure that all existing warranties on roof are maintained.

1. Roof Construction
2. Date of Acceptance of Roof System
3. Roofing System Manufacturer
4. Roofing Contractor
5. Roof System Description
6. Wind Uplift Classification
7. Date of Last Inspection
8. Roof Manufacturer's Warranty

E. The cost of any and all inspections by any third party shall be the responsibility of the General Contractor.

F. Enforcement: The procedures and protocol specified in this section and in the Roofing Protection Method Statement are to be adhered to by all persons on the roof.

1.2 QUALITY ASSURANCE

A. Protection of Installed Roofing Meeting: Before beginning work on roof areas, schedule and conduct a meeting at the site to review the roof protection construction procedures and coordination among the trades. Require the attendance of representatives of each Sub-Contractor who will have labor working on or above existing roofing, including mechanical and electrical sub-contractors and equipment vendors.

1. Inform the Architect and Owner in advance of the scheduled meeting time.
2. Attendance by the Architect and Owner is at their discretion.
3. Schedule this meeting immediately following the Pre-Roofing Meeting referred to in Division 07.
4. Take minutes and attendance. Circulate same to all who attend and submit same to Architect.

B. Restrict roof access to personnel and those people specifically designated by the Architect and/or Owner as requiring such access.

C. Where required, provide physical protection of existing and new roofing.

D. Roof protection shall comply with all applicable codes and standards and shall conform to all applicable safety standards including OSHA and Department of Labor and Industries.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF SECTION
PART 1 – GENERAL

1.1 SUMMARY

A. This section specifies requirements for Substantial Completion, including:
   1. Substantial Completion.
   2. Progress Punch List Inspections.
   3. Re-inspection fees.
   4. Project Record Documents.
   5. Operation and Maintenance Manuals and Warranties.
   6. Submittal of spare parts and maintenance materials.
   7. Owner training.

1.2 SUBSTANTIAL COMPLETION AND SUBSTANTIAL COMPLETION PROCESS:

A. Definition of Substantial Completion:
   1. For the purposes of this project: “The time and day when construction has substantially met the requirements of the Construction Documents and construction allows the Owner to legally use the project anywhere and everywhere for the Owner’s intended purpose.”

B. The General Contractor shall organize a Substantial Completion meeting and walkthrough with the Owner and Architect.
   1. After the walkthrough, declaration of Substantial Completion will be determined.
   2. Complete final cleaning of the work or of the portion of the work which is designated for Substantial Completion, as specified in Section 01 74 00 “PROGRESS, FINAL CLEANING AND POST PUNCH LIST REPAIR CLEANING”, prior to the Substantial Completion walkthrough.

C. Submit the following a minimum of two business days prior to or at the time and date of Substantial Completion:
   1. Certifications, testing reports, and preliminary balancing reports, and similar information substantiating that project conforms to the requirements of the Contract Documents.
   2. Commissioning reports, if any.
   3. Final meter readings, if applicable.
   4. Application for reduction of retainage (and consent of surety if applicable).
   5. List of Incomplete Work which will be recognized as exceptions which will be appended to Architect’s Certificate of Substantial Completion.
6. One copy of each warranty required by the Contract Documents, in the name of the Owner, endorsed by the General Contractor, and in a form reasonably acceptable to the Architect. (The Architect will accept unbound warranties at this time; these warranties will be returned to the General Contractor for binding into the binders specified in this Section).

7. Draft Operation and Maintenance Manuals consistently organized into suitable bound and indexed sets.

8. Owner training complete with a written certification of same signed by the General Contractor and the Owner.

9. Checklist of activities and deliverables required for Substantial Completion and Final Completion including mutually agreeable dates.

10. Typed list of major subcontractors and suppliers with addresses and emergency telephone numbers.

11. Project Record Documents

12. Confirmation of closed Exceptions and Rolling Punch List items.

13. Written statement from the General Contractor certifying that all hazardous materials associated with the work performed or brought to the jobsite by construction personnel as required to execute the work has been removed and/or disposed of properly.
   a. Provide a list of any hazardous materials that will remain on the site that are specifically required to perform


15. Architect will verify that a statement regarding hazardous materials has been provided prior to issuing Certificate of Substantial Completion.

16. Submit written certification to the Architect that the Project or designated portion thereof, has achieved Substantial Completion.
   a. Include contractor’s Punch List and list of Incomplete Work.
   b. If the Architect agrees that the Project has achieved Substantial Completion, the Architect will take the following actions:
      i. Review the work of the project determined by the General Contractor as Substantially Complete and prepare an additional list of items that the Architect requires to be completed or corrected ("Punch List"), as determined by the inspection(s).
      ii. Prepare and issue a Certificate of Substantial Completion on a form provided by the Architect, including:
          • Date of Substantial Completion.
          • Punch List. Include items from the walk through with the Owner and Architect.
          • Schedule for completion of Punch List items provided by the Contractor.
          • Date and time on which the Owner will occupy the Work or designated portion thereof.
          • Responsibilities of the Owner and General Contractor for transfer of insurance, utilities, operation of
mechanical and electrical systems, maintenance, cleaning, and security.

- Signatures of Architect, General Contractor, and Owner.
- The Contractor shall complete punch list work in accordance with the schedule for completion as defined in Item above.

c. Should Architect consider the work to be less than substantially complete, the Architect will:
   i. Promptly notify the General Contractor in writing, listing incomplete or defective work.
   ii. The General Contractor shall take immediate steps to correct the remaining item and send a second written certification that work is substantially complete.
   iii. The Architect will re-inspect the work.

d. Warranties required by the Contract Documents for work cited as not substantially complete shall commence when such work is accepted as substantially complete.

e. Remove construction facilities and temporary controls, except those that are required to complete incomplete work.

f. Architect will verify that Project Record Documents are complete and accurate.

Warranties:

a. Submit all warranties with a Warranty Summary Sheet identifying Section, Item, Warranty Start, Warranty End, Warranty Holder.

b. All Warranties will be in the name of the Owner.

1.3 MULTIPLE SUBSTANTIAL COMPLETION PUNCH LIST INSPECTIONS/MULTIPLE SUBSTANTIAL COMPLETION PROCESSES:

A. In the event multiple Substantial Completion Punch List Inspections are required prior to Substantial Completion, the requirements of this Section apply.

B. The Architect has included in his fee time for a single Substantial Completion Process including associated inspections.

1. If, due to decisions made solely by the General Contractor, the General Contractor requires multiple Substantial Completion Processes and/or multiple Substantial Completion Punch List Inspections prior to Substantial Completion, the Architect will proceed on an hourly basis.

2. The hourly fees will be in accordance with the schedule of fees and charges appended to the Architect-Owner Agreement, or in the absence thereof, the hourly rate in effect at the time of the multiple Substantial Completion Processes and/or multiple Substantial Completion Punch List Inspections request.
3. If the General Contractor invokes multiple Substantial Completion Processes and/or multiple Substantial Completion Punch List Inspections, the General Contractor thereby accepts the conditions of this paragraph B in its entirety.

C. General Contractor produces "Progress Punch List Schedule" of subdivided project areas or systems to coordinate with construction sequence.

E. This Schedule will establish dates when each area will be substantially complete and ready for "Progress Punch List" inspection.

F. General Contractor submits "Progress Punch List Schedule" to Architect for review and comment.

G. Mutually agreeable "Progress Punch List Schedule" is established.

H. For each area or system, General Contractor submits to Architect and Owner "Request For Progress Punch List Inspection" per established "Progress Punch List Schedule" with "General Contractor’s Punch List" for that area or system.
   1. Notification includes date when inspection is requested. Notification will be issued a minimum of 2 days prior to requested inspection date.
   2. Should Architect consider the Work to be less than substantially complete, the Architect will promptly notify the General Contractor in writing, listing incomplete or defective Work.
      a. The General Contractor shall take immediate steps to remedy deficiencies.
      b. The General Contractor will then send a second written certification that work is substantially complete.
      c. If the Architect considers the area or system substantially complete, the Architect will re-inspect the area or system.
   3. Not later than 5 days of the requested inspection date, the Architect will amend the “General Contractor’s Punch List with additional observations and return it electronically to the General Contractor as the “Progress Punch List.”
      a. Architect's Progress Punch List will include room name, room number, date of inspection, and observation.
      b. General Contractor completes "Progress Punch List" for each area with item numbers, building zone, Punch List item completion date, and subcontractor added and distributes to the Architect.
      c. "Progress Punch List" for each area is compiled into a comprehensive "Master Progress Punch List" as each area is completed.
      d. The "Master Progress Punch List" will be maintained and managed by the General Contractor.
      e. General Contractor to coordinate with Architect for sign-off of completed "Master Progress Punch List" items after sign-off by subcontractor and General Contractor.
I. At the time of Project Substantial Completion, remaining "Master Progress Punch List" items and any additional Punch List items are compiled into and become “The Punch List” with anticipated completion dates and attached to The Certificate of Substantial Completion.

1.4 RE-INSPECTIONS FEES:

A. When the Architect is caused to perform more than the following inspections due to failure of Work to comply with the Contract Documents and or a single date of Substantial Completion or incomplete work, the General Contractor, through the Owner will compensate the Architect for such additional services on an hourly basis. The hourly fees will be in accordance with the schedule of fees and charges appended to the Architect-Owner Agreement, or in the absence thereof, the hourly rate in effect at the time of the multiple Progress Punch List Inspection Requests.

B. The following represent the inspections for which time is allocated in the Architect’s fee:
   1. Progress Punch List Inspection:
      a. The Architect will append observations to the General Contractor’s written and typed Punch List.
   2. Substantial Completion Punch List Inspection:
      a. The Architect will review corrections called for in the combined General Contractor’s Punch List with the appended observations by the Architect.
   3. Final Completion Inspection:
      a. The Architect’s final inspection immediately prior to the Certificate of final Completion.

C. Costs for additional inspections will be billed to the Owner by the Architect. Such amounts will be deducted from the Contract Sum payable to the General Contractor.
   1. The Architect will notify both the Owner and General Contractor prior to making additional inspections.

1.5 PROJECT RECORD DOCUMENTS:

A. Project Record Documents are not As-Built Documents. (See below of As-Built Documents).

B. Documents and Samples on the Site:
   1. General Contractor to keep on file at job site one complete set of up-to-date Contract Documents, including drawings and specifications, addenda, shop drawings and product data, testing data, change orders, field orders, and other modifications.
   2. At Substantial Completion, these documents and samples shall be referred to as the Project Record Documents.
3. During Construction, store Project Record Documents neatly and securely, in files or on racks, clearly indexed by trade activity or Specification Section.

4. Do not use Project Record Documents for construction purposes.

C. On the Project Record Documents, legibly mark significant field changes such as following, using colored pencils, or felt-tipped pens, assigning a different color to each trade.
   1. Require Fire Protection, Mechanical Plumbing, Fire Detection, Voice Data and Electrical trades to mark up their own work on these Record Documents.
      a. Drawings: Locations of concealed utilities, changes in field dimensions and details, changes resulting from change order or field order, and details not on original drawings.
      b. Keep mark-up Drawings set up to date.

D. The Architect may request to review the Project Record Documents at any time during the project.
   1. Submit the Project Record Documents as requested to Architect who shall, after review for completeness, not for content return them to the General Contractor.
   2. The General Contractor and its Sub-Contractors are solely responsible for the content and accuracy of the Project Record Documents.
   3. Keeping the Project Record Documents up to date is a requirement of the Contract and shall be considered when the Architect is reviewing Payment Requisitions.

1.6 AS-BUILT DOCUMENTS:

A. Obtain from the Architect, at the General Contractor’s expense, a clean set of As-Designed CAD files.

B. The General Contractor shall modify the As-Designed Documents to show all modifications, changes, decisions, clarifications, actual dimensions and locations, and similar information as recorded on the Project Record Drawings.

C. The General Contractor shall verify actual field conditions and make changes necessary to record actual construction in place.
   1. The General Contractor and Sub-Contractors from each trade shall be responsible for producing accurate As-Built drawings of Work.

D. As-Built Document Submittal Requirements:
   1. The General Contractor shall collect As-Built Documents from all subcontractors, review documents for completeness.
   2. The General Contractor shall compile all subcontractor As-Built Documents into one complete set in electronic format.
3. The General Contractor shall submit two blackline print sets and one electronic copy of the As-Built Documents to the Architect for review.

4. The Architect shall review the As-Built Document submittal for format only.

5. The General Contractor and his Sub-Contractors is solely responsible for the content and accuracy of the As-Built Documents.

6. Submit As-Built Documents to the Owner in the following quantities:
   a. Owner: Two hard copies and one electronic copy.

1.7 OPERATION AND MAINTENANCE MANUALS, SPARE PARTS, AND WARRANTIES

A. Prior to Substantial Completion, submit to the Architect the intended table of contents of the Operation and Maintenance (O&M) Manuals that the General Contractor intends to submit to the Owner.

1. Upon acknowledgement by the Architect that the intended table of contents is complete, reasonable organized, and satisfies the Specifications, submit a draft of the Operation and Maintenance Manuals, list of warranties, and list of spare parts.

2. 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, special finishes, whether or not a submittal is specifically required by the technical sections of these Specifications.
   a. Include CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT PLAN as identified in Section 01 35 46.
   b. Include instructions for installation, start-up, operation, inspections, maintenance, parts lists, and data sheets.
   c. 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. Organize the Operation and Maintenance Manuals as follows:

1. Bind in 3-ring binders with vinyl cover.

2. Cover and Spine:
   a. Identify each volume number (i.e. 1 of 12) on front and spine with typed or printed title "OPERATION AND MAINTENANCE MANUAL," title of Project, date, identity of subject matter covered in each particular volume.
   b. On spine, place information so it reads “right side up” when the binder cover faces up.

3. Inside Cover/Title Page:
   a. Repeat information on the cover and identify the General Contractor

4. Table of Contents:
   a. For each volume, arranged in CSI Division and Section as per the Specification order, neatly typewritten.
   b. Organize information by systems, following the sequence of the Table of Contents of the Project Manual.
5. Separate products and system within the binder by tabbed and labeled dividers.
6. If binder contains information on products or systems from more than one Division of the Specifications, provide separate labeled tab for each Division.
7. 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.
8. List of extended or special warranties, with a summary of the duration of the warranty.
   a. This information shall immediately follow the Table of Contents.
9. List of spare parts incorporated in appropriate divisions.

C. 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 subcontractor to prepare maintenance instructions.

D. Information for complex systems, such as the elevator, 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.

E. Warranties and Guarantees:
   1. Assemble one fully executed copy of each warranty, bond, and service and maintenance contract.
   2. Warranties required are specified in the respective Specification sections.

F. Submittal:
   1. Submit one review copy of the fully compiled O&M Manual in final form to the Architect.
   2. The Architect will review for completeness and organization only.
      a. The content accuracy and detail of the O&M Manual is solely the responsibility of the General Contractor.

1.8 ATTIC STOCK, SPARE PARTS, AND MAINTENANCE MATERIALS AS SPECIFIED

A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual Specification Sections.
   1. Where Attic Stock, Spare Parts, and Maintenance Materials, are specified, identify the following in the O&M Manual:
      a. Description
      b. Quantity
      c. Detail
      d. Spare parts shall be neatly wrapped or packaged in standard sizes and clearly labeled with content and date.
B. Deliver to Project site and place in location as directed by Owner.
   1. Obtain approval from the Owner prior to Final Completion.
   2. Approval will be in the form of the fully executed Provide Attic Stock Certification.

C. Provide Attic Stock Certification.
   1. Insert Provide Attic Stock Certification in O&M Manual in the position of this Section 01 77 20.

1.9 OWNER TRAINING:

A. Where Specifications require that General Contractor provide training for the Owner's personnel, provide such training in accordance with this Article and prior to the date of Substantial Completion.

B. General Contractor shall provide a training schedule.

C. Schedule training at least seven days in advance, and at a time convenient for the Owner, when the appropriate trainees will be available.

D. Provide for the Owner's use, a draft of the relevant Operations and Maintenance Manual (O&M Manual) during training.

E. Record the training sessions on video for subsequent use by the Owner.

F. When training is complete, prepare and submit to the Architect for the Owner's records, a report of the training.
   1. Include project name, name and address of the General Contractor and of the Sub-Contractor or individual providing the training, brief description of the item or system which was the subject of the training, dates, times and duration of the training, and names and job identification or title of Owner's personnel in attendance.
   2. Briefly report on activities or events occurring during the training period, describing problems or questions that arose (if any) and how these were resolved.

G. Provide Executed Training Certificate.
   1. Execute Training Certificate and insert in the O&M Manual in the position of this Section 01 77 20.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF SECTION

01 77 20
SUBSTANTIAL COMPLETION
Page 9 of 9
<table>
<thead>
<tr>
<th>Ref. No.</th>
<th>Product/Item</th>
<th>Prepared By</th>
<th>To</th>
<th>When</th>
<th>Spec Ref.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Certificate of Substantial Completion</td>
<td>Architect</td>
<td>Contractor</td>
<td>Concludes Substantial Completion Phase</td>
<td>Section 01 77 20; Para 1.2.G.</td>
<td>Must be preceded by a request form the Contractor. See Item #24.</td>
</tr>
<tr>
<td>2</td>
<td>Certifications, Testing Reports, Preliminary Balancing Reports</td>
<td>Contractor</td>
<td>Architect</td>
<td>Substantial Completion or later if agreeable by Architect</td>
<td>Section 01 77 20; Para 1.2.D.1</td>
<td>Submit not later than 14 calendar days after receipt of Certificate of Substantial Completion is received from Architect. Absence of a Report will be recorded as an Exception after the date of Substantial Completion</td>
</tr>
<tr>
<td>3</td>
<td>Short form Commissioning Reports</td>
<td>Contractor</td>
<td>Architect</td>
<td>Substantial Completion</td>
<td>Section 01 77 20; Para 1.2.D.2</td>
<td>Commissioning shall be complete prior to Substantial Completion</td>
</tr>
<tr>
<td>4</td>
<td>Changeover Documentation related to Owner's Occupancy and Use, including final meter readings if necessary</td>
<td>Contractor</td>
<td>Owner</td>
<td>Substantial Completion</td>
<td>Section 01 77 20; Para 1.2.D.3</td>
<td>Architect will review, but not for accuracy.</td>
</tr>
<tr>
<td>5</td>
<td>Application for Reduction of Retainage and Consent of Surety</td>
<td>Contractor</td>
<td>Owner/Architect</td>
<td>Substantial Completion</td>
<td>Section 01 77 20; Para 1.2.D.4</td>
<td>Earlier application will be considered based on Contractor performance.</td>
</tr>
<tr>
<td>6</td>
<td>List of items to be corrected and List of items to be completed prior to Final Completion</td>
<td>Contractor</td>
<td>Architect</td>
<td>Substantial Completion</td>
<td>Section 01 77 20; Para 1.2.D.5</td>
<td>To be Submitted as Contractor's &quot;Punch List&quot; (Submitted along with request to Architect for Substantial Completion). Contractor's Punch List shall be submitted together at the time of Request for Substantial Completion.</td>
</tr>
<tr>
<td>7</td>
<td>Copy of Each Special Warranty in the name of the Owner, endorsed by the Contractor</td>
<td>Contractor</td>
<td>Owner</td>
<td>Substantial Completion</td>
<td>Section 01 77 20; Para 1.2.D.6</td>
<td>May be submitted loose to Architect. Architect will return loose warranties to be included in O&amp;M manuals.</td>
</tr>
<tr>
<td>8</td>
<td>Draft Operation and Maintenance Manuals</td>
<td>Contractor</td>
<td>Architect</td>
<td>Substantial Completion</td>
<td>Section 01 77 20; Para 1.2.D.7</td>
<td>Architect to review and comment.</td>
</tr>
<tr>
<td>9</td>
<td>Training Report</td>
<td>Contractor</td>
<td>Owner/Architect</td>
<td>Must be completed prior to receipt of Certificate of Occupancy.</td>
<td>Section 01 77 20; Para 1.2.D.8</td>
<td>Requires sign-off by Owner</td>
</tr>
<tr>
<td>10</td>
<td>Complete Checklist of Activities and Deliverables required for Substantial Completion and Final Completion.</td>
<td>Contractor</td>
<td>Architect</td>
<td>Checklist and schedule shall be submitted immediately after last sub-contractor is retained.</td>
<td>Section 01 77 20; Para 1.2.D.9</td>
<td>Checklist to include schedule with milestones.</td>
</tr>
<tr>
<td>11</td>
<td>Typed list of Major Subcontractors and Supplier with addresses and Emergency Telephone Numbers</td>
<td>Contractor</td>
<td>Owner/Architect</td>
<td>List shall be submitted immediately after last sub-contractor is retained, and updated at Substantial Completion.</td>
<td>Section 01 77 20; Para 1.2.D.10</td>
<td>Part of O &amp; M Manual</td>
</tr>
<tr>
<td>12</td>
<td>Project Record Documents</td>
<td>Contractor - supported by sub-contractors</td>
<td>Architect</td>
<td>Record Drawings shall be completed by Substantial Completion. Obtain As Designed Drawings from Architect.</td>
<td>Section 01 77 20; Para 1.2.D.11</td>
<td>Obtain As-Designed drawing file from Architect at Substantial Completion to serve as a base for the As-Built Drawings. Submit As-Built drawings not less than 14 calendar days before the date of Final Completion.</td>
</tr>
<tr>
<td>13</td>
<td>Written statement from the Contractor regarding hazardous materials</td>
<td>Contractor</td>
<td>Architect</td>
<td>Substantial Completion</td>
<td>Section 01 77 20; Para 1.2.D.13</td>
<td>Architect will verify that a statement regarding hazardous materials has been provided prior to issuing Certificate of Substantial Completion.</td>
</tr>
<tr>
<td>14</td>
<td>List of closed exceptions.</td>
<td>Architect</td>
<td>Contractor</td>
<td>Substantial Completion</td>
<td>Section 01 77 20; Para 1.2.D.12</td>
<td>To obtain Final Completion, all exceptions must be closed.</td>
</tr>
<tr>
<td>15</td>
<td>Arrange with Owner for Changeover from Construction Keying to Permanent Final Keying</td>
<td>Contractor</td>
<td>Owner</td>
<td>Substantial Completion</td>
<td>Section 01 77 20; Para 1.2.E.</td>
<td>Coordinate with Owner Facility Manager.</td>
</tr>
<tr>
<td>16</td>
<td>Architect receives request for Substantial Completion from Contractor. Contractor's Punch list and List of Incomplete Work is submitted together at the time of Request for Substantial Completion from the Contractor.</td>
<td>Contractor</td>
<td>Architect</td>
<td>To Initiate Substantial Completion</td>
<td>Section 01 77 20; Para 1.2.F.</td>
<td>Request for Substantial Completion is a precedent for item #1.</td>
</tr>
<tr>
<td>17</td>
<td>Architect (and Owner if Owner wishes) Reviews Completed Work.</td>
<td>Owner/Architect</td>
<td>N/A</td>
<td>Within One Week after Receipt of Notification required under Item 14. above. Prior to issuance of G704.</td>
<td>Section 01 77 20; Para 1.2.B.</td>
<td>Review is predicated on receipt of Contractor's Punch List and List of Incomplete Work.</td>
</tr>
<tr>
<td>18</td>
<td>Architect appends a list of items to be completed or corrected (Punch List) to the Contractor's Punch List. List is compiled as determined by review.</td>
<td>Architect</td>
<td>Contractor</td>
<td>Upon notification (multiple notifications may be appropriate)</td>
<td>Section 01 77 20; Para 1.2.G.1</td>
<td>Architect and CM to agree on format and management in advance of Substantial Completion.</td>
</tr>
<tr>
<td>19</td>
<td>Architect prepares a Certificate of Substantial Completion AIA G-704</td>
<td>Architect</td>
<td>Owner/Contractor</td>
<td>Substantial Completion</td>
<td>Section 01 77 20; Para 1.2.G.2</td>
<td>Signed by CM, Owner and Architect. See specific action items regarding Insurance; Security; Maintenance; Heat/HVAC; Utilities; and Damage.</td>
</tr>
<tr>
<td>20</td>
<td>Contractor Completes Punch List Work in accordance with agreed-on Schedule that is part of the Architect prepared Certificate of Substantial Completion.</td>
<td>Contractor</td>
<td>Architect</td>
<td>Completion of all Punch List work and Incomplete work is a prerequisite for Final Completion</td>
<td>Section 01 77 2; Para 1.2.G.3.</td>
<td>All punch-list work managed by Contractor based on written punch list.</td>
</tr>
<tr>
<td>21</td>
<td>If Architect determines that Work is Less than Substantially Complete, Architect will notify Contractor in Writing Listing Incomplete or Defective Work.</td>
<td>Architect</td>
<td>Contractor</td>
<td>Will delay Substantial Completion</td>
<td>Section 01 77 20; Para 1.2.H.</td>
<td>See Remark above.</td>
</tr>
<tr>
<td>22</td>
<td>Remove construction facilities and temporary controls (except those that are required to complete incomplete work)</td>
<td>Contractor</td>
<td>During Substantial Completion</td>
<td></td>
<td>Section 01 77 20; Para 1.2.J.</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Architect will verify that Project Record Documents are complete and accurate</td>
<td>Architect</td>
<td>CM</td>
<td>During Substantial Completion, prior to issuing a certificate of Substantial Completion</td>
<td>Section 01 77 20; Para 1.2.K.</td>
<td></td>
</tr>
<tr>
<td>Ref. No.</td>
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<tr>
<td>24</td>
<td>Submit written certification to the Architect that the Project or designation portion thereof, has achieved Substantial Completion. Include Contractor's Punch List and List of Incomplete Work. Refer to Article 9 of AIA Document A201, General Conditions of the Contract of Construction.</td>
<td>Contractor</td>
<td>Architect</td>
<td>If accepted by the Architect, will initiate Substantial Completion.</td>
<td>Section 01 77 20; Para 1.2.F.</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Complete “Punch List” items recognized as an exception to substantial completion.</td>
<td>Contractor</td>
<td>Substantial Completion</td>
<td></td>
<td>Section 01 77 20; Para 1.3.G.</td>
<td>Refer to Item #6</td>
</tr>
<tr>
<td>26</td>
<td>Architect will re-inspect work to determine whether it is complete.</td>
<td>Architect</td>
<td></td>
<td></td>
<td>Section 01 77 20; Para 1.3 &amp; 1.4</td>
<td></td>
</tr>
</tbody>
</table>
PART 1 - GENERAL

1.1 SUMMARY

A. This section specifies requirements for Project Closeout / Final Completion, including:
   1. Final Completion.
   2. Final Completion Inspections.
   3. Final As-Built Documents.

1.2 FINAL COMPLETION:

A. General Contractor shall submit written certification to the Architect that the Project has been completed in accordance with the Contract Documents, including punch list items, and is ready for Final Inspection.

1.3 ARCHITECT’S FINAL INSPECTION

A. The Architect will make a single final inspection within one week after receipt of the General Contractor’s certification, or as otherwise agreed upon in specific instances.

B. Should the Architect consider that the Project has achieved Final Completion in accordance with the Contract Documents:
   1. The Architect will ask the General Contractor to make Project closeout submittals required for Final Completion.

C. Should the Architect consider that the Project has not achieved Final Completion:
   1. The Architect will immediately notify the General Contractor stating reasons, and the General Contractor shall immediately complete the Work, request inspection, and otherwise comply with this Contract.

1.4 CLOSEOUT SUBMITTALS:

A. The General Contractor shall prepare closeout submittals and submit to the Owner with a copy to the Architect prior to Final Completion, allowing sufficient time for Owner review in accordance with a mutually agreeable schedule:
   1. Final As-Built Documents.
   2. Final balancing reports.
   3. Project warranties (guarantees) and maintenance agreements, assembled in binders in accordance with Section 01 77 20, “SUBSTANTIAL COMPLETION”.
   4. Final completed Project Operation and Maintenance Manuals assemble in binders in accordance with Section 01 77 20, “SUBSTANTIAL COMPLETION”.

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PROJECT CLOSE-OUT and FINAL COMPLETION
Page 1 of 3
5. Spare parts neatly wrapped or packaged in standard sizes and clearly labeled.
6. Building location survey for new construction, if required by local authority or the Owner.
7. Certificate of insurance for products and completed operations.
8. Consent of Sureties to Final Payment for Performance and Payment Bonds furnished under this Contract.
9. An affidavit that all bills and indebtedness connected with the Work have been paid.
10. Waivers of lien from all subcontractors and suppliers, or a bond satisfactory to the Owner indemnifying Owner against all liens or other claims.
11. Proof that taxes, fees and similar obligations have been paid.
12. Additional changeover documentation which may be required by Owner's lender and Owner's property insurer.
13. All Approved Submittals organized by Specification Sections.
15. Comprehensive list documenting manufacturer, model number and color for all building finishes, loose furniture and system furniture (if any) installed as part of the General Contractor's work on the project.
16. Comprehensive list documenting all lamps and ballasts installed on the project.
17. A final written statement from the General Contractor certifying that all hazardous materials associated with the work performed or brought to the jobsite by construction personnel as required to execute the work has been removed and/or disposed of properly.
   a. Provide a list of any hazardous materials that will be turned over to the Owner as Attic Stock.
   b. Do not submit the same statement required during Substantial Completion.
18. The General Contractor shall provide a list of material and equipment bought under the General Conditions. The Owner shall have the right to take possession of this material and equipment. The General Contractor shall have the option to purchase the material and equipment at the Owner’s discretion.

B. Complete all incomplete work recognized as an exception to Substantial Completion ("Punch-List" items).

C. Remove remaining construction facilities and temporary controls.

D. Re-clean, if necessary, to standards specified in in Section 01 74 00 “PROGRESS AND FINAL CLEANING”.
   1. Remove surplus materials and rubbish.

E. The Architect will re-inspect as part of Final Completion Inspection to determine whether it is complete.

F. Submit Final Application for Payment to the Owner.
G. The Architect’s signature to the Final Application for Payment identifies successful Final Completion and closes out the Project.

1. Upon successful Final Completion, the Architect will issue a Letter of Final Completion to both the Owner and the General Contractor with a copy retained for the Architect’s files.

1.5 FINAL COMPLETION CLOSEOUT PROCEDURES MATRIX

A. The Project Closeout / Final Completion Closeout Procedures Matrix will be reviewed with the Contractor at the time of Substantial Completion.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF SECTION
<table>
<thead>
<tr>
<th>Ref. No.</th>
<th>Product/Item</th>
<th>Developed By</th>
<th>To</th>
<th>When</th>
<th>Spec Ref.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Contractor shall submit written certification to the Architect that the Project has been completed in accordance with the Contract Documents, including punch list items, and is ready for final completion.</td>
<td>Contractor</td>
<td>Architect</td>
<td>Final Completion</td>
<td>Section 01 77 30; Para 1.2A</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>If Architect determines that Project has achieved final completion in accordance with the contract documents, the architect will ask the contractor to make project closeout submittals.</td>
<td>Architect</td>
<td>Contractor</td>
<td>Prior to Final Completion</td>
<td>Section 01 77 30; Para 1.2.B.1.</td>
<td>Architect to make written request of OM for final closeout documents.</td>
</tr>
<tr>
<td>3</td>
<td>If Architect determines that the Project has not achieved final completion, Architect will notify contractor in writing stating the reasons.</td>
<td>Architect</td>
<td>Contractor</td>
<td>Prior to Final Completion</td>
<td>Section 01 77 30; Para 1.2.B.2.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Prepare Closeout Submittals and submit to Architect prior to end of final completion allowing sufficient time for review (mutually agreeable schedule)</td>
<td>Contractor</td>
<td>Architect</td>
<td>Submit in advance of Final Completion such that Architect has sufficient time to review and comment. Allow for re-submittals as required.</td>
<td>Section 01 77 30; Para 1.2.C.</td>
<td>Organize into indexed and labeled 3-ring binders with matching spines and covers. Include cross-referenced tables of contents. Organize by CSI Section.</td>
</tr>
<tr>
<td>a.</td>
<td>As-Built Documents</td>
<td></td>
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<td>Section 01 77 30; Para 1.2.C.4.</td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>Final Balancing Reports</td>
<td></td>
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</tr>
<tr>
<td>c.</td>
<td>Project Warranties (guarantees) and maintenance Agreements made out in the name of the Owner.</td>
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<tr>
<td>d.</td>
<td>Completed Project Operation and Maintenance Manuals</td>
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<td>e.</td>
<td>Spare Parts (if any) delivered to Owner.</td>
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<tr>
<td>f.</td>
<td>Building Location Survey</td>
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<tr>
<td>g.</td>
<td>Certificate of Insurance for Products and Completed Operations</td>
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</tr>
<tr>
<td>h.</td>
<td>Consent of Sureties to Final Payment for Performance and Payment Bonds</td>
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</tr>
<tr>
<td>i.</td>
<td>Affidavit that all bills and indebtedness connected with work has been paid.</td>
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<td></td>
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</tr>
<tr>
<td>j.</td>
<td>Waivers of lien from all subcontractors and suppliers, or at option of the Owner a Lien Waiver Bond indemnifying Owner against all liens or other claims.</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>k.</td>
<td>Proof that taxes, fees, and other obligations have been paid by the Contractor.</td>
<td></td>
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</tr>
<tr>
<td>l.</td>
<td>Additional changeover documentation required by Owner, Owner's lender, and Owner's property insurer.</td>
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</tr>
<tr>
<td>m.</td>
<td>Approved submittals organized by specification section.</td>
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</tr>
<tr>
<td>n.</td>
<td>Attic stock certification (if any)</td>
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</tr>
<tr>
<td>o.</td>
<td>Comprehensive list documenting manufacturer, model number and color for all building finishes, loose furniture and system furniture installed on the project.</td>
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</tr>
<tr>
<td>p.</td>
<td>Comprehensive list documenting all lamps and ballasts installed on the project.</td>
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</tr>
<tr>
<td>q.</td>
<td>Written statement from the Contractor regarding hazardous materials.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Complete Incomplete Work recognized as an exception to Substantial Completion (&quot;Punch List&quot; items). The Architect will re-inspect to determine whether it is complete.</td>
<td>Contractor</td>
<td>Final Completion</td>
<td>Section 017 7 30; Para 1.2D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Warranties for Work cited as Not Substantially Complete shall commence when work is accepted as substantially complete</td>
<td>Contractor</td>
<td>Owner</td>
<td>Final Completion</td>
<td>Section 01 77 20; Para 1.2.I.</td>
<td>All other warranties begin at substantial completion.</td>
</tr>
<tr>
<td>Ref. No.</td>
<td>Product/Item</td>
<td>Developed By</td>
<td>To</td>
<td>When</td>
<td>Spec Ref.</td>
<td>Remarks</td>
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</tr>
<tr>
<td>7</td>
<td>Remove remaining construction facilities and temporary controls.</td>
<td>Contractor</td>
<td></td>
<td></td>
<td>Section 01 77 30; Para 1.2.E.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Re-clean (if necessary) to Standards for Final Cleaning. Remove Surplus Materials and Rubbish.</td>
<td>Contractor</td>
<td></td>
<td></td>
<td>Section 01 77 30; Para 1.2.F.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Submit list of material and equipment bought under the General Conditions.  The Owner shall have the right to take possession of this material. The Contractor shall have the option to purchase the material and equipment at the Owner's discretion.</td>
<td>Contractor</td>
<td>Architect</td>
<td>Final Completion</td>
<td>Section 01 77 30; Para 1.2.C.17</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Remove Construction Sign</td>
<td>Contractor</td>
<td></td>
<td>Immediately Prior to the Conclusion of the work</td>
<td></td>
<td>Contractor shall arrange for legal disposal of Construction Sign</td>
</tr>
<tr>
<td>11</td>
<td>Submit Final Application for payment.</td>
<td>Contractor</td>
<td>Architect</td>
<td>Final Completion</td>
<td>Section 01 77 30; Para 1.2.G and Section 01 29 00</td>
<td>Include Contractor's request for final retainage</td>
</tr>
<tr>
<td>12</td>
<td>Sign Final requisition and submit Architect's Final Completion Letter.</td>
<td>Architect</td>
<td>Contractor and Owner</td>
<td>Conclusion of the Project</td>
<td>Section 01 77 30; Para 1.2.G and Section 01 29 00</td>
<td>Architect's signature on the Final Application for Payment identifies successful Final Completion and closes out the Project. The Architect's Final Completion Letter is a non contractual formality</td>
</tr>
</tbody>
</table>
PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. General Conditions, Supplementary Conditions and applicable parts of Division 1 form a part of this specification and the Contractor shall consult them in detail for instructions.

B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade.

1.02 RELATED WORK UNDER OTHER SECTIONS

A. Asbestos Remediation

1.03 HAZARDOUS MATERIALS PROCEDURE

A. Asbestos:

1. Asbestos Materials Exist On-Site: There are accessible and inaccessible asbestos containing materials (ACM) in the existing buildings. ACM affected by the Renovation project are included under this contract. The General Contractor shall refer to items below. The General Contractor shall formally notify each subcontractor that there are ACM existing in the buildings. Hidden ACM may only be found during Demolition. Refer to items 2 and 3 below.

2. Unknown and inaccessible ACM: During the Demolition work of the Contract, it is possible that previously unknown asbestos materials may be discovered in currently concealed locations.

3. Notification: If the General Contractor discover or encounter any ACM during the performance of the work, the General Contractor shall immediately:
   a. Stop work, notify the Owner and OPM about the presence of suspect ACM and request instructions for proper action, and
   b. Take whatever steps and measures are necessary to reduce, control or eliminate the risk of exposure of workers and the public to the ACM.
   c. Every effort will be made to obtain DEP (12 working day notification period) waivers to remove hidden or unforeseen ACM by the asbestos contractor. The General Contractor shall allow enough time for the removal of the ACM at no additional charges to the owner for delays and should waivers be denied.

4. Responsible Person On-Site: The General Contractor shall designate one of its senior on-site employees to oversee coordination between the Architect, the General Contractor, and all subcontractors with respect to hazardous materials issues.

5. Responsibility for Hazardous Material Discovery: It is the sole responsibility of the General Contractor and its Subcontractors to undertake whatever measures, methods of procedures are necessary, required or otherwise appropriate to safeguard the health and safety of all workers and members of the public with respect to...
identification and discovery of previously unknown hazardous materials during the work of the Project.

6. Indemnification: To the fullest extent permitted by law, the General Contractor and General Contractor shall indemnify and hold harmless the Owner and the Architect and their agents and employees from and against all claims, damages, losses and expenses including, but not limited to, attorneys’ fees arising out of or relating to the performance of the Work, including the discovery or identification of any hazardous materials, provided that any such claim, damage, loss or expense if attributable to bodily injury, sickness, disease or death, or to damage to or destruction of tangible property (other than the Work itself) including the lose of use resulting therefrom; and is caused in whole or in part by any negligent act or omission of the General Contractor and General Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.

B. Lead:

1. The General Contractor and all Trades shall be made aware that Lead Based Paint exists on painted surfaces throughout the buildings.
2. It is the General Contractor and all Trades responsibility to either test painted surfaces or assume that all existing painted surfaces are coated with Lead Paint. All costs for testing shall be the responsibility of the General Contractor and all Trades at no additional cost to the Owner.
3. All the work of this Contract shall conform to the standard set by all applicable Federal, State and Local laws, regulations, ordinance and guidelines in such from in which they exist at the time of the work on the Contract and as may be required by subsequent regulations.
4. The General Contractor shall retain the services of a Massachusetts licensed lead abatement contractor to remove/de-lead painted surfaces as needed during the project.
5. The General Contractor and all Trades are solely responsible for means and methods, and techniques used for demolition and lead control. The General Contractor and all Trades shall collect, and control lead contaminated debris and to properly remove and dispose of lead contaminated soil around each building due to demolition activities.
6. The General Contractor and all Trades shall at his own cost and expense comply with all laws, ordinance, rules and regulations of Federal, State, Regional and Local authorities during demolition, prepping, sanding, cutting, burning, scraping, painting over, grinding and regarding handling, storing and disposing of lead and lead contaminated waste material.
7. The General Contractor and all Trades shall submit to the Architect prior to commencing of work the following:
   a. Written respiratory and notification program
   b. Written lead compliance program in accordance with OSHA regulations including:
      1. Training requirement certifications.
      2. Supervisor qualifications.
      3. Written compliance program specific to this project
4. Respirators fit test records.
5. Medical surveillance certificates.

8. The EPA and the DEP require demolition debris with lead to be tested in accordance with the Toxicity Characteristic Leaching Procedure (TCLP) to determine the potential for significant amounts of lead to leach out of the waste. If the results are below the DEP standard (5.0 ppm), the waste may be disposed of in a conventional landfill for demolition debris. If, however, the TCLP results are above the DEP standard, the waste must be disposed of in a DEP approved, hazardous waste landfill. The General Contractor and all Trades shall at own cost and expense perform all required testing of waste by the TCLP. The General Contractor and all Trades must submit to the Owner copy of tests performed and all waste shipment records prior to disposing of debris. The Owner reserves the right to have own TCLP samples collected to verify results. All disposal costs shall be at the General Contractor and all Trades responsibility.

9. The following references are cited as current applicable publications. This project is subject to compliance with the all regulations including but not limited to:
   a. Commonwealth of Massachusetts, Department of Labor and Work Force Development 454 CMR 11.00, Structural Painting Safety Code, as currently amended.
   b. Commonwealth of Massachusetts, Department of Environmental Protection, and Hazardous Materials Regulations at 310 CMR 30.00 as currently amended.
   e. Commonwealth of Massachusetts, Department of Labor and Work Force Development 454 CMR 22.00.
   f. Commonwealth of Massachusetts, Department of Environmental Protection, 310 CMR 6.0-8.0.
   g. Commonwealth of Massachusetts, Department of Environmental Protection ABC rubble rules.

10. All above regulations are applicable to this project. Where there is a conflict between this section and the applicable regulations, the more stringent requirement shall prevail.

C. PCB’s:

   1. The General Contractor and all Trades shall be made aware that buildings materials (Material) including but not limited to painted surfaces, glue, roofing, coatings, caulking and other buildings materials are likely to contain >1 ppm of Polychlorinated Biphenyls PCB’s.
   2. Due to the difficulty associated with exhaustive testing of all surfaces, glue, and coatings within the buildings, the Owner has elected to direct the General Contractor and all Trades to assume that these surfaces do, in fact, contain PCB’s and to take all necessary steps for their compliant removal and disposal.
3. **EPA does not require testing and therefore, testing will not be performed or permitted.**

4. **All the work of this Contract shall conform to the standard set by all applicable Federal, State and Local laws, regulations, ordinance and guidelines.**

5. **The General Contractor and all Trades are solely responsible for means and methods, and techniques used for demolition and control. The General Contractor and all Trades shall collect and control PCB’s contaminated debris and soil.**

6. **The General Contractor and all Trades shall at its own cost and expense comply with all laws, ordinance, rules and regulations of Federal, State, Regional and Local authorities during prepping, sanding, cutting, burning, scraping, painting over, grinding and regarding handling, storing and disposing of contaminated waste material and during demolition of the buildings.**

**E. Silica Dust:**

1. **The General Contractor and all Trades shall be made aware that buildings materials (Material) may contain Silica.**

2. **Due to the difficulty associated with exhaustive testing, the Owner has elected to direct the General Contractor and all Trades to assume that Silica was found.**

3. **The General Contractor and all Trades shall review and comply with most recent US Department of Labor Final Rule and shall take extra precautions to protect workers and other personnel on site.**

**PART 2 – (PRODUCTS) Not Used**

**PART 3 – (EXECUTION) Not Used**

**END OF SECTION**
PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to Demolition and removal of selected portions of buildings and structures down to sound substrate and as required for new Work. Refer to the Drawings for additional requirements.
   1. Salvage of existing items to be reused or turned over to the Owner. See Drawings.
   2. Removal and legal disposal of demolished materials off site. Except those items specifically designated to be relocated, reused, or turned over to the Owner, all existing removed materials, items, trash and debris shall become property of the Demolition Sub-contractor and shall be completely removed from the site and legally disposed of at its expense.
   3. Demolition and removal work shall properly prepare for alteration work and new construction to be provided under the Contract.
   4. Scheduling and sequencing operations without interruption to 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.

B. Related Work: The following items are not included in this Section and are specified under the designated Sections:
   1. Section 01 50 00 - GENERAL REQUIREMENTS for Temporary Facilities and Controls:
      a. Maintenance of access, cleaning during construction, dust and noise control.
   2. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT:
      a. Waste management and recycling.
   3. Section 02 82 13 - ASBESTOS ABATEMENT AND RELATED WORK:
      a. Removal, handling and disposal of asbestos-containing materials.
4. Division 22 - PLUMBING:
   a. Disconnecting, capping and otherwise making inactive existing plumbing services in areas where demolition and removal work is required. Tradesmen will disconnect, cap, inactivate and lower to floor such items where required to be removed under Division 22 - PLUMBING. Removal and storage of such materials shall be then done under this Section 02 41 13 – SELECTIVE DEMOLITION.
   b. Disconnect and reinstallation of plumbing equipment temporarily interrupted during construction.

5. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING:
   a. Disconnecting, capping and otherwise making inactive existing mechanical services in areas where demolition and removal work is required. Mechanical tradesmen will disconnect, cap, inactivate and lower to floor such items where required to be removed under Division 23 - HEATING, VENTILATING AND AIR CONDITIONING. Removal and storage of such materials shall be then done under this Section 02 41 13 – SELECTIVE DEMOLITION.
   b. Disconnect and reinstallation of HVAC equipment temporarily interrupted during construction.

6. Division 26 - ELECTRICAL:
   a. Disconnecting, capping and otherwise making inactive existing electrical services in areas where demolition and removal work is required. Electrical tradesmen will disconnect, cap, inactivate and lower to floor such items where required to be removed under Division 26 - ELECTRICAL. Removal and storage of such materials shall be then done under this Section 02 41 13 – SELECTIVE DEMOLITION
   b. Disconnect and reinstallation of electrical equipment temporarily interrupted during construction.

7. Other Hazardous Material Remediation.
   a. Remediation of hazardous material other than mold and mildew remediation will be completed under separate contract in advance of start of demolition work.
   b. Existing conditions mold and mildew remediation will be executed in accordance with best practices. Notify the Architect of location and extend prior to remediating. Contract will be adjusted in accordance required remediation.

1.3 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.

1.4 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 Owner that may be encountered during selective demolition remain property of the Owner as applicable.

B. Marble slabs making up the existing mezzanine toilet partitions shall remain the property of the Owner.

C. Carefully remove each item or object in a manner to prevent damage and deliver promptly to a location acceptable to the Owner.

1.5 SUBMITTALS

A. Schedule of Selective Demolition Activities: Indicate the following:
   1. Detailed sequence of selective demolition and removal work, with early and late starting and finishing dates for each activity. Ensure Owner’s on-site operations are uninterrupted if applicable.
   2. Interruption of utility services. Indicate how long utility services will be interrupted.
   3. Coordination for shutoff, capping, and continuation of utility services.
   4. Use of existing elevator and existing stairs:
      a. Use of existing elevator for construction purposes is prohibited unless authorized by owner. If authorized, interior and exposed exterior of elevator and doors shall be protected from damage.
      b. Stairs, railings and stairway walls shall be protected from damage during demolition.
      c. Damage caused shall be repaired at no expense to the Owner
   5. Locations of proposed dust- and noise-control temporary partitions and means of egress, including for other occupants affected by selective demolition operations.
   6. Coordination of Owner’s continuing occupancy of portions of existing building and of Owner’s partial occupancy of completed Work.
7. Means of protection for items to remain and items in path of waste removal from building.

B. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged, and turned over the Owner.

C. Pre-demolition Video: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by selective demolition operations. Comply with Section 01 33 00 - SUBMITTAL PROCEDURES. Submit before Work begins.

D. Landfill Records: Provide trip tickets (receipts) indicating receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.
   1. Comply with submittal requirements in Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT.

1.6 QUALITY ASSURANCE

A. Examination of Existing Conditions: The General Contractor and Demolition Sub-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 General Contractor and Demolition Sub-Contractor shall visit the site and examine the existing conditions as they find them and shall inform themselves 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 Sub-Contractor: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

C. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

D. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

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

F. Pre-demolition Conference: Conduct conference at Project site, with the Architect and Owner’s Representative present, to comply with requirements in Division 1. 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.

G. Cutting:
   1. Cut surfaces so that there is minimal difference between existing and new surfaces when patched.
   2. All cuts at the edge of demolished areas to be clean, straight and true.

H. Shoring:
   1. This Demolition Sub-Contractor is responsible for the design and installation of all shoring
   2. Shoring shall be designed by a professional structural engineer registered in the Commonwealth of Massachusetts with stamp and signature indicating same.

I. Demolition Sub-Contractor Qualifications:
   1. Five (5) years documented experience successfully performing demolition of the type, scale and complexity indicated for this project.
   2. Only licensed or specialized trade technicians shall demolish Fire Protection, Plumbing, Heating, Ventilating, Air Conditioning, Electrical services, systems and equipment.

J. Regulations:
   1. Comply with Regulations of the
      a. Massachusetts Building Code including all appendices
      b. Requirements of the EPA
      c. Requirements of the City of New Bedford, Massachusetts.
   2. Standards:
      1. ANSI A10.6
      2. NFPA 241

K. Protection:
   1. Erect protection for pedestrians and vehicular traffic.
   2. Provide temporary barricades to limit access to demolition areas.
   3. Protect all existing construction to remain.
   4. Protect all adjacent property from damage.
1.7 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.

PART 2 - PRODUCTS

2.1 PRODUCTS

A. Provide new products and tools in good working order suitable for demolition and protection work.

B. Products shall meet all fire-resistance and structural requirements to maintain a clean and safe working environment to both contractors and tenants.

PART 3 – EXECUTION

3.1 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 Architect.

E. Engage a professional engineer registered in the Commonwealth of Massachusetts to survey the 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.

F. Survey of Existing Conditions: Record existing conditions by use of preconstruction video.
   1. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work.
2. Make permanent record of measurements, materials, and construction details required to make exact reproduction.

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

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
   1. Arrange to shut off indicated utilities with utility companies and Owner.
   2. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
   3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing. Where entire wall is to be removed, existing services/systems may be removed with removal of the wall.
   4. Prior to commencing cutting work in existing surfaces, take all precautionary measures to assure that mechanical and electrical services to the particular area have been made inactive. Coordinate with Fire Protection, Plumbing, HVAC, and Electrical Sub-contractors. Only licensed tradesmen of that particular trade shall disconnect and cap existing mechanical and electrical items that are to be removed, abandoned and/or relocated.
   5. If, during the process of cutting work, existing utility lines are encountered which are not indicated on the Drawings, regardless of their condition, immediately report such items to the Architect. Do not proceed with work in such areas until instructions are issued by the Architect. Continue work in other areas.

3.3 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 specified in Section 01 50 00 - TEMPORARY FACILITIES and CONTROLS.
   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 Architect 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.

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.

3.4 SELECTIVE DEMOLITION, GENERAL

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. Dispose of demolished items and materials promptly. Comply with requirements in Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT.

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 Architect, 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 and Demolition Sub-Contractor shall inspect closely each item specifically designated to be relocated, reused, or turned over to the Owner prior to its removal, and immediately report damages and defects to the Architect and the Owner. The General Contractor shall be responsible for any subsequent damage to the same

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SELECTIVE DEMOLITION
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other than latent defects not readily apparent from close inspection, and shall bear responsibility for its repair or same replacement as directed by the Architect, to the satisfaction of the Owner.

2. 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.

3.5 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, workmen, and Owner’s employees 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 Architect, and to the satisfaction of the Owner.

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.

3.7 DISCOVERY of OTHER HAZARDOUS MATERIALS

A. If hazardous materials, such as chemicals, asbestos-containing elements or materials not specifically identified in this specification section, lead paint-
containing elements or materials not specifically identified in this specification section, or other hazardous materials are discovered during the course of the work, cease work in affected area only and immediately notify the Architect and the Owner of such discovery. Do not proceed with work in such areas until instructions are issued by the Architect. 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 Architect and the Owner of such discovery. Do not proceed with work in such areas until instructions are issued by the Architect. Take immediate precautions to prohibit endangering the containers integrity. Continue work in other areas.

3.8 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.

3.9 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Comply with requirements of Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT 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.

3.10 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Premises shall be left in a clean condition and ready to accept alteration work and new construction.

END OF SECTION
PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
   1. Pressure washing horizontal and vertical surfaces of existing exterior concrete ramps and stairs along courtyard side of building, including existing stone steps at front (Hillman St.) of Building 9.
   2. Thoroughly cleaning all existing walking surface expansion and control joints.
   3. Clean rust stains from concrete surfaces.
   5. Apply new horizontal and vertical surface concrete coating at concrete ramps and stairs.

B. Related Work: The following items are not included in this Section and are specified under the designated Sections:
   1. Section 03 33 00 CONCRETE for new concrete at base of existing ramp.
   2. Section 07 92 00 JOINT SEALANTS for non-ramp joints, sealants and installation.

1.3 QUALITY ASSURANCE

A. Manufacturing Qualifications:
   1. The manufacturer of the specified product shall be ISO 9001/9002 certified and have in existence a recognized ongoing quality assurance program independently audited on a regular basis.

B. Installation Requirements:
   1. Install materials in accordance with all safety and weather conditions required by manufacturer or as modified by applicable rules and regulations of local, state and federal authorities having jurisdiction.
   2. Consult Material Safety Data Sheets for complete handling recommendations.

C. Restoration Specialist:
1. Work must be performed by a firm having not less than five (5) years successful experience in comparable concrete repair projects, and employing personnel skilled in the restoration process and operations indicated.

2. Only skilled journeyman masons and/or cement finishers who are familiar and experienced with the materials and methods specified and are familiar with the design requirements shall be employed for concrete restoration.

3. One skilled journeyman mason or cement finisher, shall be trained and certified by the concrete repair system manufacturer and shall be present at all times during concrete restoration and shall personally direct the work.

4. As a minimum the technical representative of the concrete repair system manufacturer shall be present at the start and at appropriate times during concrete restoration work as follows.
   a. The manufacturer's technical representative shall be present to review conditions and methods prior to start of work.
   b. The manufacturer's technical representative shall be present to review conditions when surface preparation has been substantially performed, but prior to patching.
   c. The manufacturer's technical representative shall be present to review conditions when patching work is approximately 50% complete.
   d. The manufacturer's technical representative shall be present to review conditions and perform a final inspection upon substantial completion of work.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each product indicated including recommendations for their application and use. Include test reports and certifications substantiating that products comply with requirements.

B. Submit the following items in time to prevent delay of the work and to allow adequate time for review and resubmittals, if needed. Do not order materials or start work before receiving the written approval.
   1. Written certificates from the concrete repair system manufacturer shall be submitted stating that at least one installer of the concrete repair system has successfully completed a training workshop for installation of the patching material, or have met alternative workmanship qualifications acceptable to the concrete repair system manufacturer.
   2. Product Data Sheets for all specified materials.
   3. Material Safety Data Sheets (MSDS) for all specified materials.
   4. Certificates from the concrete repair system manufacturer that all materials supplied comply with the requirements of these specifications and the appropriate standards.
5. Restoration Program:
   a. Submit written program for each phase of restoration process including protection of surrounding material on building and site during operations.
   b. Describe in detail material, methods and equipment to be used for each phase of restoration work.
   c. If alternative methods and materials to those indicated are proposed for any phase of restoration work, provide written description, including evidence of successful use on other, comparable projects, and program of testing to demonstrate effectiveness for use on this project.

1.5 ENVIRONMENTAL CONDITIONS

   A. Environmental Conditions:
      1. Do not apply material if it is raining or snowing or if such conditions appear to be imminent.
      2. Minimum air and surface application temperature 45°F and rising for 24 consecutive hours minimum.

   B. Protection:
      1. Precautions should be taken to avoid damage to any surface near the work zone due to mixing and handling of the specified material.

1.6 DELIVERY, STORAGE AND HANDLING:

   A. Deliver materials to site in manufacturer's original unopened containers and packaging, bearing labels as to type and names of products and manufacturers.

   B. Deliver and store restoration material in manufacturer's original, unopened containers with the grade, batch and production data shown on the container or packaging.

   C. Protect restoration materials during storage and construction from wetting by rain, snow or ground water, and from staining or intermixture with earth or other types of materials.

   D. Protect grout, mortar and other materials from deterioration by moisture and temperature.
      1. Store in a dry location or in waterproof containers. Keep containers tightly closed and away from open flames.
      2. Protect liquid components from freezing.

3. Comply with manufacturer's recommendations for minimum and maximum temperature requirements for storage.

E. Comply with the manufacturer's written specifications and recommendations for mixing, application, and curing of grouts and patching materials.

1.7. Warranty

A. Provide a written warranty from the manufacturer in the name of the Owner against defects of materials for a period of one (1) year, beginning with date of substantial completion of the project.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Sika U.S.
Sika Corporation
201 Polito Avenue
Lyndhurst, NJ 07071
Telephone: 1-800-933-SIKA

B. PROSOCO, Inc.,
3741 Greenway Circle, Lawrence, KS 66046.
Phone: (800) 255-4255; Fax: (785) 830-9797.
E-mail: CustomerCare@prosoco.com

2.2 PRODUCTS

A. Concrete Crack Repair
1. Product: Sikadur® Crack Weld Crack Injection Kit

2. Description: Two component, low viscosity, fast curing epoxy sealing system for repairs to cracks in concrete and solid masonry. Conforms to ASTM C-881.

3. Where To Use:
   a. Low pressure injection of cracks in structural concrete and solid masonry.
   b. Gravity feed cracks in horizontal concrete and horizontal solid masonry.

4. Kit Includes:
   a. Cap Seal (x2) 300 ml
   b. Injection Resin (x2) 250 ml
   c. Capseal mixer nozzle (x2)
   d. Capseal applicator fan (x2)
   e. Cartridge Flow Restrictor (x1)
f. Injection resin mixers with extended tube (x2)  
g. Push fit connector (x1)  
h. Injection Ports (x16)  
i. Pair of Gloves (x2)  
j. Wooden Applicator (Tongue Depressor) (x2)  
k. Instructional DVD (x1)

5. Typical Data (Material and curing conditions @ 73°F (23°C) and 50% R.H.)

<table>
<thead>
<tr>
<th>Gel Time (min)</th>
<th>Ready for Injection (min)</th>
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<tr>
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### Consumption of Crack Injection Resin in a crack

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<th>Depth (in)</th>
<th>Cu. Inches</th>
<th># of Tubes</th>
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<tr>
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<td>2</td>
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</tr>
<tr>
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<td>1</td>
<td>30</td>
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</tr>
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<td>120</td>
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<td>1.5</td>
<td>45</td>
<td>2.4</td>
</tr>
<tr>
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<td>2</td>
<td>60</td>
<td>3.2</td>
</tr>
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### Consumption of Crack Injection Paste on a crack

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<th>Length (in)</th>
<th>Width (in)</th>
<th>Depth (in)</th>
<th>Cu. Inches</th>
<th># of Tubes</th>
</tr>
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<td>0.125</td>
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<td>120</td>
<td>2</td>
<td>0.25</td>
<td>60</td>
<td>3.2</td>
</tr>
</tbody>
</table>
B. Cement-Based Concrete Coating System

1. Product: Sika Sikagard® FlexCoat

2. Description:
   a. Two-component, polymer-modified, waterproof, cement-based coating system.
   b. Polymerized cementitious protective coating. It consists of a unique rubber-like polymer liquid (Part A) mixed at the time of application with a cement aggregate blend (Part B).

3. Application Information:
   a. Coverage: 250 ft²/coat/unit (Coverage figures do not include allowance for surface profile and porosity or material waste)
   b. Coat thickness: 60 mils
   c. Number of coats: 2
   d. Ambient Air Temperature > 50 ºF (10 ºC)
   e. Substrate Temperature > 50 ºF (10 ºC)

C. Concrete Restoration Cleaner

1. Prosoco Sure Klean® Light Duty Restoration Cleaner
   a. Technical Data
      1. FORM: Clear, gelled liquid
      2. SPECIFIC GRAVITY: 1.12
      3. TOTAL SOLIDS: N/A
      4. pH: 1.5-2.0
      5. WT./GAL.: 9.34 lbs.
      6. FLASH POINT: N/A
      7. FREEZE POINT: 5 degrees F (-15 degrees C)

   b. Limitations
      1. Mildly acidic. Not for polished marble or polished travertine.
      2. May damage some nonmasonry surfaces.
      3. May have limited effect on highly porous surfaces. Contact PROSOCO Customer Care for product recommendation.
      5. Not for use on treated low-E glass; acrylic and polycarbonate sheet glazing; and glazing with surface-applied reflective, metallic or other synthetic coatings and films.
PART 3 - EXECUTION

3.1 CONCRETE CRACK REPAIR

A. Substrate Preparation:
   a. For a successful application, very thorough preparation is a must. The crack to be treated must be dry and free from oil, grease, dust and other contaminants. Any loose material must be blown or brushed clear.
   b. For Vertical Cracks (walls, columns, beams) - The surface of the crack should be sealed with the fast setting Sikadur Capseal supplied. The Capseal should also be used to affix the injection ports. The distance between the injection ports should be greater than the estimated depth of the crack (typically 1.5 times. If depth is not known, consult technical services).
   c. For Horizontal Cracks (floors, slabs, etc.) - The Sikadur Capseal and injection ports may not be required as the resin may be introduced into the crack by gravity.

B. Mixing:
   a. Cartridge Set Up:
      i. Sikadur Capseal - Open screw cap, cut film to remove metal clip and attach nozzle, extrude waste until a uniform color is achieved.
      ii. Sikadur Injection Resin - Remove screw cap, insert outlet plugs, attach mixer nozzle with extension tube*.
      iii. Extrude waste to form a homogeneous mix. Use the push fit connector to connect to injection port.
      iv. *For horizontal cracks (floor, slab, etc.), remove the extension tube.

C. Application:
   a. For Vertical Cracks (walls, columns, beams) - The resin should be injected into the first (lower) port. When the resin begins to flow from the adjacent port, close off the first port and disconnect the hose. Reconnect to the second port and inject until resin starts to flow from the third; this process is repeated until the whole crack has been injected. After the resin has been allowed to cure, the injection ports and capseal should be removed and any holes or voids should be filled.
   b. For Horizontal cracks (floors, slabs, etc.) - To gravity feed cracks, seal the underside of the substrate prior to filling if the crack reflects through. Dispense the injection resin slowly into the vee-notched crack. Continue injecting until completely filled.

D. Removal:
   a. After the resin has been allowed to cure, the injection ports and capseal should be mechanically removed and any holes or voids should be filled.

E. Limitations:
b. Minimum age of concrete must be 21-28 days, depending on curing and drying conditions.
c. Do not apply over wet, glistening surfaces.
d. Not for injection of cracks subjected to osmotic or hydrostatic pressure during application.
e. Do not inject cracks greater than 1/4 in (6mm). Consult Sika Technical Services.
f. Not an aesthetic product. Color may alter due to variations in lighting and/or UV exposure.
g. NOT FOR USE AS AN ANCHORING ADHESIVE.

F. PRIOR TO EACH USE OF ANY SIKA PRODUCT, THE USER MUST ALWAYS READ AND FOLLOW THE WARNINGS AND INSTRUCTIONS ON THE PRODUCT’S MOST CURRENT PRODUCT DATA SHEET, PRODUCT LABEL AND SAFETY DATA SHEET WHICH ARE AVAILABLE ONLINE AT HTTP://USA.SIKA.COM/ OR BY CALLING SIKA’S TECHNICAL SERVICE DEPARTMENT AT 800.933.7452 NOTHING CONTAINED IN ANY SIKA MATERIALS RELIEVES THE USER OF THE OBLIGATION TO READ AND FOLLOW THE WARNINGS AND INSTRUCTIONS FOR EACH SIKA PRODUCT AS SET FORTH IN THE CURRENT PRODUCT DATA SHEET, PRODUCT LABEL AND SAFETY DATA SHEET PRIOR TO PRODUCT USE.

G. For further information and advice regarding transportation, handling, storage and disposal of chemical products, users should refer to the actual Safety Data Sheets containing physical, ecological, toxicological and other safety related data. Read the current actual Safety Data Sheet before using the product. In case of emergency, call CHEMTREC at 1-800-424-9300, International 703-527-3887.

3.2 CEMENT-BASED CONCRETE COATING SYSTEM

A. SURFACE PREPARATION
   a. Surface must be clean and sound.
   b. Remove all deteriorated concrete, dirt, oil, grease, and other bond-inhibiting materials from the area to be repaired.
   c. An open textured surface ICRI CSP-3 is recommended.
   d. Deeper areas shall be patched with appropriate patch material like SikaQuick® or SikaRepair® products.

B. MIXING
   a. Place the liquid component in appropriate mixing container.
   b. It is always recommended to start mixing with approximately 80 % of the liquid.
   c. Add the powder while continuing to mix with a lowspeed drill (400–600 rpm) and paddle.
d. Mix to a uniform consistency, maximum 3 minutes.

C. APPLICATION
   a. Pre-wet surface to SSD (Saturate Surface Dry).
   b. Insure good intimate contact with the substrate is achieved.
   c. Sikagard® FlexCoat can be applied in multiple coats by brush, roller, trowel or spray to a typical thickness of 60 mils (1.5 mm).
   d. Apply first coat of Sikagard® FlexCoat.
   e. Apply following coats (one or two depending on service conditions/requirements) by brush, trowel roller or spray.
   f. Finish to specified texture.
   g. Protect newly applied Sikagard® FlexCoat from direct sunlight, wind, rain and freezing.

D. LIMITATIONS
   a. Minor shade variation may occur with natural cement color material.
   b. Not suitable for use in areas where acids or other aggressive chemicals are spilled.
   c. Top coats strongly recommended for color uniformity.
   d. Will reflect dynamic concrete cracks.
   e. Static and dynamic cracks can be detailed in accordance with accepted industry practices of using embedding mesh or other methods to reduce the reflecting of cracks.
   f. Sikagard® FlexCoat is a dense, cement-based waterproofing material that is vapor permeable. This product will not create a vapor barrier.
   g. Efflorescence in the existing substrate can result in the failure of the bond or discoloration of the surface if there are areas of concrete that are not protected from water ingress.
   h. Sikagard® FlexCoat has been tested with Sikagard® Flexcoat ATC. Use of any other top coat needs to be tested for compatibility and performance.
   i. As with all cement based materials, avoid contact with aluminum to prevent adverse chemical reaction and possible product failure. Insulate potential areas of contact by coating aluminum bars, rails, posts etc. with an appropriate epoxy such as Sikadur® 32 Hi-Mod.
   j. Do not install Sikagard® FlexCoat in cold weather (i.e. below 50 ºF/10 ºC ) or when rainfall can be expected prior to material setting.
   k. All technical data stated in this Product Data Sheet are based on laboratory tests. Actual measured data may vary based upon statistical variations depending upon

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REPAIR of EXTERIOR CAST-IN-PLACE CONCRETE RAMPS & STEPS
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mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.

3.3 CONCRETE RESTORATION CLEANER

A. Test Area

1. Test a minimum 4 ft. by 4 ft. area on each type of masonry. Use manufacturer’s application instructions. Let the test panel dry 3 to 7 days before inspection. Keep test panels available for comparison throughout the cleaning project.

B. Application

1. Before applying, read “Preparation” and “Safety Information” sections in the Manufacturer’s Product Data Sheet for Light Duty Restoration Cleaner. Do not dilute or alter.
2. Prewet the surface with clean water.
3. Apply cleaner using a brush or roller. Gently scrub to improve results.
4. Let cleaner dwell for 5 to 15 minutes. Gently scrub heavily soiled areas. Don’t let cleaner dry on the surface. If drying occurs, lightly wet treated surfaces with fresh water. Reapply the cleaner in a gentle scrubbing manner.
5. Rinse thoroughly with clean water. The best combination of rinsing pressure and water volume is provided by masonry washing equipment generating 400-1000 psi with a water flow rate of 6-8 gallons per minute delivered through a 15-45 degree fan spray tip. Equipment should be adjustable to reduce water flow rate and rinsing pressure as required for controlled cleaning of more sensitive surfaces. See also “Equipment” section of the Product Data Sheet.
6. Repeat steps 1 through 4 above if necessary.
7. Note: Application to surfaces exposed to direct sunlight or high winds may cause rapid drying. When possible, clean when surfaces are shaded from direct sunlight. Wet hot surfaces with fresh water immediately before applying cleaner to remove loose soiling and reduce surface temperature. Do not let cleaner dry on the surface. If drying occurs, lightly wet treated surfaces with fresh water and reapply the cleaner in a gentle scrubbing manner.

3.8 CLEANING:

A. Leave finished work and work area in a neat, clean condition without evidence of spillovers onto adjacent areas.

END OF SECTION
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
   1. New concrete curb wall against ramp at Entrance 3.

B. Related Sections:
   1. Section 03 01 30 - REPAIR of EXTERIOR CAST-IN-PLACE CONCRETE RAMPS & STEPS

1.3 DEFINITION

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast furnace slag, and silica fume; subject to compliance with requirements.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
   1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
   1. Location of construction joints is subject to approval of the Architect.

E. Qualification Data: For Installer and manufacturer.

F. Material Certificates: For each of the following, signed by manufacturers:
   1. Cementitious materials.
   2. Admixtures.
   3. Form materials and form-release agents.
   4. Steel reinforcement and accessories.
   5. Curing compounds.
   7. Semirigid joint filler.
   9. Repair Materials

G. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
   1. Aggregates.

H. Field quality-control reports.

I. Minutes of pre-installation conference.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
   1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."
E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
   1. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

G. Preinstallation Conference: Conduct conference at Project site.
   1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
      a. Contractor's superintendent.
      b. Concrete subcontractor.
   2. Review procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, contraction and isolation joints, and joint-filler strips, Semi-rigid joint fillers, forms and form removal limitations, steel reinforcement installation, slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.6 DELIVERY, STORAGE, AND HANDLING

   A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

   A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.

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

   C. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, Grade 60, deformed bars, assembled with clips.

   D. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.

2.2 REINFORCEMENT ACCESSORIES
A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs; epoxy-coated.

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

2.3 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
   1. Portland Cement: ASTM C 150, Type I/II, gray. Supplement with the following:
      a. Fly Ash: ASTM C 618, Class F or C.
      b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Silica Fume: ASTM C 1240, amorphous silica.

C. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.
   2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.


E. Water: ASTM C 94/C 94M and potable.

2.5 ADMIXTURES


B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
   1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
   2. Retarding Admixture: ASTM C 494/C 494M, Type B.
   3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
   4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
2.6 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Axim Italcementi Group, Inc.; CATEXOL CimFilm.
      b. BASF Construction Chemicals - Building Systems; Confilm.
      c. ChemMasters; SprayFilm.
      d. Conspec by Dayton Superior; Aquafilm.
      e. Dayton Superior Corporation; Sure Film (J-74).
      f. Edoco by Dayton Superior; BurkeFilm.
      g. Euclid Chemical Company (The), an RPM company; Eucobar.
      h. Kaufman Products, Inc.; Vapor-Aid.
      i. Lambert Corporation; LAMBCO Skin.
      j. L&M Construction Chemicals, Inc.; E-CON.
      k. Meadows, W. R., Inc.; EVAPRE.
      l. Metalcrete Industries; Waterhold.
      m. Nox-Crete Products Group; MONOFILM.
      n. Sika Corporation; SikaFilm.
      o. SpecChem, LLC; Spec Film.
      p. Symons by Dayton Superior; Finishing Aid.
      q. TK Products, Division of Sierra Corporation; TK-2120 TRI-FILM.
      r. Unitex; PRO-FILM.
      s. Vexcon Chemicals, Inc.; Certi-Vex Envio Set.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.
      b. BASF Construction Chemicals - Building Systems; Kure 200.
c. ChemMasters; Safe-Cure Clear.
d. Conspec by Dayton Superior; W.B. Resin Cure.
e. Dayton Superior Corporation; Day-Chem Rez Cure (J-11-W).
f. Edoco by Dayton Superior; Res X Cure WB.
g. Euclid Chemical Company (The), an RPM company; Kurez W VOX; TAMMSCURE WB 30C.
i. Lambert Corporation; AQUA KURE - CLEAR.
j. L&M Construction Chemicals, Inc.; L&M Cure R.
k. Meadows, W. R., Inc.; 1100-CLEAR.
l. Nox-Crete Products Group; Resin Cure E.
m. Right Pointe; Clear Water Resin.
n. SpecChem, LLC; Spec Rez Clear.
o. Symons by Dayton Superior; Resi-Chem Clear.
p. TK Products, Division of Sierra Corporation; TK-2519 DC WB.
q. Vexcon Chemicals, Inc.; Certi-Vex Enviocure 100.

F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating.

B. Semi-rigid Joint Filler: Two-component, semi-rigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.

2.8 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
   1. Cement Binder: ASTM C 150, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
   2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
   3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
   4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlay:ment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.
   1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
   2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
   3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
   4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.9 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
   1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
   1. Fly Ash: 25 percent.
4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.

5. Silica Fume: 10 percent.

6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.

7. Combined Fly Ash or Pozzolans, Ground Granulated Blast-Furnace Slag, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.

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

D. Admixtures: Use admixtures according to manufacturer's written instructions.
   1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
   2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

2.10 CONCRETE MIXTURES

A. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:
   1. Minimum Compressive Strength: 4000 psi at 28 days.
   2. Minimum Cementitious Materials Content: 520 lb./cu. yd..
   3. Slump Limit: 4 inches, plus or minus 1 inch.
   4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.
   5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.11 FABRICATING REINFORCEMENT

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

2.12 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.
   1. When air temperature is between 85 and 90°F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90°F, reduce mixing and delivery time to 60 minutes.
PART 3 – EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
   2. Class B, 1/4 inch for rough-formed finished surfaces.

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

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
   1. Install keyways, reglets, recesses, and the like, for easy removal.
   2. Do not use rust-stained steel form-facing material.

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

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

H. Chamfer exterior corners and edges of permanently exposed concrete.

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

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

K. Retighten forms and bracing before placing concrete, as required, to prevent leaks and maintain proper alignment.
L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.3 REMOVING AND REUSING FORMS

A. General: Formwork that does not support weight of concrete may be removed after cumulatively curing at not less than 50°F for 24 hours after placing concrete. Concrete shall be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

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

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

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
   1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
   1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.5 JOINTS

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

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
   1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
   2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
   3. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
   1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
   2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 07 92 00 "JOINT SEALANTS," are indicated.
   3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

D. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
   1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
   1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
   2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
   3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
   1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
   3. Screed slab surfaces with a straightedge and strike off to correct elevations.
   4. Slope surfaces uniformly to drains where required.
   5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
   1. When average high and low temperature is expected to fall below 40°F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor’s option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.7 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

3.8 MISCELLANEOUS CONCRETE ITEMS

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

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

3.9 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb./sq. ft. x h before and during finishing operations. Apply according to
C. Formed Surfaces: Cure formed concrete surfaces, including ide of slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces Including Tops of Slabs: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
   1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
      a. Water.
      b. Continuous water-fog spray.
      c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
   2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
      a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
      b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
   3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
      a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

3.10 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.

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

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

3.11 CONCRETE SURFACE REPAIRS

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

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

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

   1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

   2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.

   3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

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

   1. Repair finished surfaces containing defects. Surface defects include spalls, pop-outs, honeycombs, rock pockets, crazing and cracks in excess
of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.

2. After concrete has cured at least 14 days, correct high areas by grinding.

3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.

4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer’s written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.

5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer’s written instructions to produce a smooth, uniform, plane, and level surface.

6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

END OF SECTION
PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following. Requirements for materials, hot-dip galvanizing, and shop-applied primers are included with each item as applicable.

1. Miscellaneous steel framing and supports:
   a. Galvanized steel framing and supports for mechanical and electrical equipment.
   b. Steel framing and supports for applications where framing and supports are not specified in other Sections; galvanized at exterior locations and in exterior walls.
   c. Prefinished slotted steel channel support framing.
   d. Steel framing and supports with shop-applied primer for countertops.
   e. Steel framing and supports for toilet partitions.

   2. Pipe Railings at exterior ramps and stairs and interior stairs.

B. Related Work: The following items are not included in this Section and are specified under the designated Sections:

   1. Section 09 90 00 - PAINTING AND COATING for field painting work of this section.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design including comprehensive engineering analysis: Design miscellaneous framing and supports, by a qualified professional engineer currently registered in the Commonwealth of Massachusetts, using performance requirements and design criteria indicated.

B. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints,
overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120°F ambient; 180°F material surfaces.

1.4 SUBMITTALS

A. Product Data: For the following:
   1. Color-galvanizing
   2. Paint products.

B. Shop Drawings: Show fabrication and installation details for metal fabrications.
   1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
   2. Provide templates for anchors and bolts specified for installation under other Sections.
   3. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer licensed in the jurisdiction where Project is located, responsible for their preparation.
   4. Where fabrications are to receive sprayed-on fireproofing, include statement that primer is compatible with fireproofing proposed for use.

C. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

D. Welding certificates.

E. Qualification Data: For professional engineer.

1.5 QUALITY ASSURANCE

A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of metal fabrications that are similar to those indicated for this Project in material, design, and extent.

C. Welding: Qualify procedures and personnel according to the following:
1. AWS D1.1, "Structural Welding Code--Steel."
4. AWS D1.6, "Structural Welding Code--Stainless Steel."

D. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.
   1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements.
   2. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
   3. Provide allowance for trimming and fitting at site.

1.7 COORDINATION

A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

B. Coordinate installation of steel weld plates and angles for casting into concrete that are specified in this Section but required for work of another Section. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 FERROUS METALS

A. Recycled Content of Steel Products: Provide products with average recycled content of steel products so postconsumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent unless such recycled content is detrimental to the quality of galvanizing.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
C. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

D. Steel Tubing: ASTM A 500, cold-formed steel tubing.

E. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.

F. Slotted Channel Framing: Cold-formed metal channels with continuous slot complying with MFMA-4.

G. Cast Iron: ASTM A 48/A 48M, Class 30, unless another class is indicated or required by structural loads.

2.2 FASTENERS

A. General: Unless otherwise indicated, provide Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.

B. Anchor Bolts: ASTM F 1554, Grade 36. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.

C. Masonry Wall -in-Place Anchors: Anchors capable of sustaining, without failure, a load equal to four times the load imposed, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.  
1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.

D. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.  

E. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.
2.3 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

C. Zinc-Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.
   1. Provide interior, field-applied primer with a VOC content of 250 g/L or less, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

   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).

E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

F. Non-shrink, Non-metallic Grout: Factory-packaged, non-staining, noncorrosive, non-gaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.4 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work true to line and level with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

2.5 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction.

B. Drill plates to receive anchor bolts and for grouting.

2.6 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Weld adjoining members together to form a single unit where indicated.

B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches, unless otherwise indicated.

2.7 SHELF ANGLES

A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inchbolts,
spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated.

1. Provide mitered and welded units at corners.
2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches larger than expansion or control joint.

B. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.8 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
   1. Fabricate units from slotted channel framing where indicated.
   2. Furnish inserts if units are installed after concrete is placed.

C. Fabricate supports for operable partitions from continuous steel beams of sizes indicated with attached bearing plates, anchors, and braces as indicated. Drill bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.

2.9 STEEL PIPE HANDRAIL AND GUARD ASSEMBLIES

A. General:
   1. Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads.
   2. Welded Connections: Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
   3. Form changes in direction of railings as detailed on the Drawings.
   4. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
   5. Close exposed ends of railing members with prefabricated end fittings.
   6. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
7. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.
   i. Connect posts to stair framing by direct welding, unless otherwise indicated.
   ii. For galvanized railings, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous-metal components.
   iii. For nongalvanized railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.

8. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

2.10 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with not less than two integrally welded steel strap anchors for embedding in concrete.

2.11 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
   1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

2.12 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.
2.13 STEEL PRIMERS AND FINISHES

A. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
1. Exteriors (SSPC Zone 1B) and Items Indicated to Receive Zinc-Rich Urethane Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Interiors (SSPC Zone 1A): SSPC-SP 7, "Brush Off Blast Cleaning."
3. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be field welded, embedded in concrete or masonry, unless otherwise indicated. Extend priming of partially embedded members to a depth of 2 inches.
5. Comply with SSPC-PA 2, "Measurement of Dry Coating Thickness with magnetic Gages."

B. Zinc-Rich Primer: Urethane zinc rich primer compatible with topcoat Specified in Section 09 90 00 - PAINTS AND COATINGS. Provide primer with a VOC content of 340 g/L (2.8 lb./gal.) or less per OTC and HAPS COMPLIANT STANDARDS PER 2007 standards when calculated according to 40 CFR 59, Subpart D (EPA Method 24). Provide Tnemec Series 394 Primer. Prime at 3.0 mils DFT or approved equal by DuPont or Carboline.
1. Provide interior, field-applied primer with a VOC content of 250 g/L or less, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.14 HOT-DIP GALVANIZING AND FACTORY-APPLIED ARCHITECTURAL FINISH

A. Hot-Dip Galvanizing: For steel exposed to the elements, weather or corrosive environments and other steel indicated to be galvanized, provide coating for iron and steel fabrications applied by the hot-dip process.
2. Comply with ASTM A 123 for fabricated products and ASTM A 153 for hardware.
3. Provide thickness of galvanizing specified in referenced standards.
4. Galvanizing bath shall contain special high grade zinc and other earthly materials.
5. Fill vent holes after galvanizing, if applicable, and grind smooth.

B. Hot-Dip Color-Galvanizing: For steel exposed to the elements, weather or corrosive environments and other steel indicated to be galvanized, provide coating for iron and steel fabrications applied by the hot-dip process.
2. Primer coat shall be factory-applied polyamide epoxy primer. Apply primer within 12 hours after galvanizing at the same galvanizer’s plant.
in a controlled environment meeting applicable environmental regulations and as recommended by the primer coating manufacturer.

3. Finish coat shall be factory-applied color-pigmented architectural finish. Apply finish coating at the galvanizer’s plant, in a controlled environment meeting applicable environmental regulations and as recommended by the finish coating manufacturer. Finish coat 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.

4. Coatings shall be certified OTC/VOC compliant and conform to applicable regulations and EPA standards.

5. Apply the galvanizing, primer, and coating within the same facility and provide single source responsibility for galvanizing, priming and finish coating.

6. Clean galvanized surface to create an acceptable profile for coatings. Galvanizer shall certify that performance will be met without blast cleaning and coating will be applied within 12 hours of galvanizing at the galvanizer’s plant. If blasted, galvanizer shall certify that rugosity standards are met.

7. Primer shall meet or exceed the following performance criteria:
   a. Abrasion Resistance per ASTM D 4060 (CS17 Wheel, 1,000 grams load), 1kg Load: 200 mg loss.
   b. Adhesion per ASTM D4541: 1050 psi.
   c. Corrosion Weathering per ASTM D5894, 13 Cycles, 4,368 Hours: Rating 10 per ASTM D714 for blistering; Rating 7 per ASTM D610 for rusting.
   d. Direct Impact Resistance per ASTM D2794: 160 in. lbs.
   e. Flexibility per ASTM D522, 180° Bend, 1 in. Mandrel: Passes.
   f. Pencil Hardness per ASTM D3363: 3B.
   g. Moisture Condensation Resistance per ASTM D4585, 100º F, 2000 Hours: Passes, no cracking or delamination.
   h. Dry Heat Resistance per ASTM D2485: 250º F.

8. Topcoat shall meet or exceed the following performance criteria:
   a. Abrasion Resistance per ASTM D 4060, CS17 Wheel, 1,000 Cycles 1kg Load: 87.1 mg loss.
   b. Adhesion per ASTM D 4541: 1050 psi.
   d. Indirect Impact Resistance per ASTM D2794: 12-14 in. pounds.
   e. Dry Heat Resistance per ASTM D2485: 200º F.
   f. Salt Fog Resistance per ASTM B 117 9,000 Hours: Rating 10 per ASTM D714 for blistering.
   g. Flexibility per ASTM D522, 180° Bend, 1/8 in. Mandrel: Passes.
   h. Pencil Hardness per ASTM D3363: 2H.
i. Moisture Condensation Resistance per ASTM D4585, 100° F, 1000 Hours: No blistering or delamination Xenon Arc Test per ASTM D 4798: Pass 300 hours.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of steel that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.2 INSTALLING BEARING AND LEVELING PLATES

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
   1. Use non-shrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use non-shrink, nonmetallic grout in exposed locations, unless otherwise indicated.
   2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.3 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS
A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for operable partitions securely to and rigidly brace from building structure.

C. Support steel girders on solid grouted masonry, concrete or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.
   1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in this Section.

D. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in this Section.
   1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.4 ADJUSTING AND CLEANING
A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
   1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Touch-Up and Repair for Galvanized Surfaces: For damaged and field-welded metal coated surfaces, clean welds, bolted connections and abraded areas.
   1. For galvanized surfaces, apply organic zinc repair paint complying with requirements of ASTM A 780, modified to 95 percent zinc in dry film. Galvanizing repair paint shall have 95 percent zinc by weight, ZIRP by Duncan Galvanizing. Thickness of applied galvanizing repair paint shall
be not less than coating thickness required by ASTM A 123 or A 153 as applicable.
   a. Touch-up of galvanized surfaces with silver paint, “brite” paint, or aluminum paints is not acceptable.
2. For factory-applied finish coatings, field-touch-up shall be performed by factory approved personnel for warranties to apply. Touch-up shall be such that repair is not visible from a distance of 2 feet.
3. A touch-up repair kit or touchup instructions shall be provided to the Owner for each type of factory-applied finish.
   a. General Contractor shall receive such touchup kits from the Sub-Contractor and shall forward touchup kits to Owner at time of Owner Training or Substantial Completion.
   b. Use transmittal with kits, Cc Architect.

END OF SECTION
PART 1 – GENERAL

1.1 GENERAL PROVISIONS

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

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
   1. Wood Blocking and Nailers
   2. Plywood Backer Panels, if any
   3. Cants.
   4. Furring.
   5. Grounds.
   6. Plywood Roof Sheathing

B. Related Work: The following items are not included in this Section and are specified under the designated Sections:
   1. Section 02 41 13 - SELECTIVE DEMOLITION
   2. Section 09 21 16 - GYPSUM BOARD ASSEMBLIES
   3. Section 23 0000 - HVAC
   4. Section 26 00 00 - ELECTRICAL

1.3 REFERENCE STANDARDS

A. U. S. Department of Commerce Product Standards:
   1. DOC PS 1, "Construction and Industrial Plywood."
   2. DOC PS 2, "Performance Standard for Wood-Based Structural Use Panels."

B. American Plywood Association Standards:
   2. APA E30, "Residential and Commercial."

C. Inspection Agencies, Abbreviations used:
   1. SPIB - Southern Pine Inspection Bureau.
   2. WWPA - Western Wood Products Association.
3. WCLIB - West Coast Lumber Inspection Bureau.

D. American Wood Preservers Association:
   1. AWPA C9: Plywood - Preservative Treatment by Pressure Process.
   2. AWPA C20: Structural Lumber - Fire-Retardant Treatment by Pressure Process.
   4. AWPA M4: Standard for the Care of Preservative Treated Wood Products.

1.4 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
   1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
   2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials, both before and after exposure to elevated temperatures when tested according to ASTM D 5516 and ASTM D 5664.

B. Material certificates for dimensional lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use as well as design values approved by the Board of Review of American Lumber Standards Committee.

C. Research reports or evaluation reports required under Quality Assurance.

D. Product Data: Submit manufacturer's printed product data, specifications, standard details, installation instructions, use limitations and recommendations for each material used. Provide certifications that materials and systems comply with specified requirements. Product data for the following products:
   1. Engineered wood products.
   2. Metal framing anchors.
   3. Construction adhesives.

E. Shop Drawings: Provide 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. Show all interfaces and relationships to work of other trades. Shop drawings showing location of each item, dimensioned plans and
elevations, large-scale details, attachment devices, and other components. Connectors shall be selected by the Contractor and submitted to the Architect for approval.

1. Show details full size.
2. Show locations and sizes of blocking and nailers, including concealed blocking and reinforcing specified in other Sections.

F. Field Measurements: Take field measurements before preparation of shop drawings and fabrication. Do not delay progress of the job. If field measurements are not possible prior to fabrication, allow for field cutting and fitting.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

B. Lumber Standard: Furnish lumber manufactured to comply with PS 20 and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.

C. Lumber Grading and Control Marks: Provide lumber with each piece factory-marked with grade stamp of applicable inspection agency evidencing compliance with grading rule requirements and identifying grading agency, species, stress grade level, moisture content at time of surfacing, and mill.

1. For exposed lumber furnish pieces with grade stamps applied to ends or back of each piece; or omit grade stamps entirely and provide certificates of grade compliance issued by inspection agency.

D. Construction Panel Standards: Comply with PS 1 for plywood construction panels and, for products not manufactured under PS 1 provisions, with APA PRP-108.

1. Furnish construction panels that are each factory-marked with APA trademark evidencing compliance with grade requirements.

E. Fire-Retardant Treated Wood: Treat according to specified AWPA standards. Obtain each type of fire-retardant chemical from one source, and each type of treated wood product from one source. Mark each piece with appropriate classification marking of Underwriter’s Laboratories, U.S. Testing, Timber Products Inspection, Inc., or other qualified testing and inspecting agency acceptable to authorities having jurisdiction.

F. Pressure-Preservative Treated Wood: Treat according to specified AWPA standards. Mark each treated item with the AWPB (American Wood Preservers Bureau) or SPIC (Southern Pine Inspection Bureau) Quality Mark.
G. Model Code Evaluation/Research Reports: Where model code evaluation/research reports are required by authorities having jurisdiction as evidence of compliance with the building code in effect for this Project, provide products for which such evaluation reports exist. Reports may be required for the following items:
   1. Metal framing anchors.
   2. Powder driven fasteners.
   3. Fire-retardant-treated wood.

H. Installer Qualifications: Arrange for rough carpentry work including framing by a firm that can demonstrate successful experience for rough carpentry and framing of projects similar in type and quality to those required for this Project.

I. Fasteners shall comply with ESR 1539/NER-272.

J. Wind Uplift: For fastening of roof sheathing at roof areas, provide fastener types, sizes, and spacing in conformance with Factory Mutual Windstorm Resistance Classification I-90. Mechanical fasteners for insulation shall be FM-approved for FM 1-90 installation, threaded, non-corroding.

1.6. COORDINATION

   A. Work under this section shall be properly coordinated with the work of other sections to assure the steady progress of all the work of the Contract.

   B. Coordinate sizes and locations of framing, blocking, reinforcements, and other related units of Work specified in other Sections to ensure that exterior architectural woodwork can be supported and installed as indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

   A. Materials when delivered to site shall be stacked and stored above the ground under protective coverings or indoors in such manner as to insure proper drainage, ventilation, and protection. No kiln dried materials shall be placed in the building until concrete and masonry work have been completed, and are sufficiently dry.

   B. Rough carpentry materials shall be stored on elevated piles to allow for air circulation below and tipped in one direction to effectively drain moisture. Lumber shall be wrapped completely, including bottoms, in waterproof tarps. Tarps shall be tied down to protect against wind blow-off.

   C. Should delays in Project be anticipated, lumber shall be stored in covered storage trailers.
D. Do not leave any newly installed wood blocking exposed. Cover and protect all new wood daily with the new roof system, or other suitable covering approved by the Architect.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Obtain and comply with wood Manufacturer’s and Installer’s coordinated advice for optimum temperature and humidity conditions for wood during its storage.

B. Weather Limitations: Proceed with installation of exterior woodwork only when existing and forecasted weather conditions will permit work to be performed and at least one coat of specified finish to be applied without exposure to rain, snow, or dampness.

C. Field Measurements: Where woodwork is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before fabrication, and show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
   1. Verify locations of concealed framing, blocking, and reinforcements that support woodwork by accurate field measurements before being enclosed. Record measurements on final shop drawings.
   2. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site and coordinate construction to ensure that actual dimensions correspond to guaranteed dimensions.

PART 2 – PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber shall be of sound stock, new, straight, of consistent size, free of stains and mildew, and kiln dried to a moisture content of not more than 19%, by weight. Where exposed or semi-exposed, wood members shall be selected for best possible appearance from the grade of stock specified.
   1. Lumber shall be surfaced four sides (S4S) and shall bear the grade and trademark of the association under whose rules it is produced, and a mark of mill identification.
   2. Lumber shall be furnished in longest practical lengths with respect to each intended use, and single length pieces shall be used wherever possible.

B. Plywood shall conform to the requirements of APA Design/Construction Guide, Residential and Commercial, and be Structural 1 rated sheathing.
C. Pressure Preservative Treated Lumber for Above Ground Use: Pressure preservative treat lumber above ground and in contact with metal and concrete in conformance with AWPA C2. Provide pressure preservative treated lumber with a minimum net retention of 0.25 pcf. Dry lumber to maximum moisture content of 19% after treatment. Use only waterborne preservatives which conform to AWPA P5. Creosote preservatives are not acceptable.
   1. Pressure preservative treat lumber in contact with ground in compliance with AWPA C2 with a minimum net retention of 0.40 pcf. Treatment shall be ACQ or approved substitute.

D. Fire-Retardant Treated Plywood for Exterior Use: Where indicated or required, provide plywood sheathing UL fire-retardant treated with treatment which yields a flame spread of not more than 25 when tested in conformance with ASTM E 84, conforms to AWPA C 27 for Exterior Type, and has successfully passed a rain test conforming to ASTM D 2898. Kiln dry after treatment to a maximum moisture content of 15%.

E. General Carpentry Material Schedule shall be as follows:

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<table>
<thead>
<tr>
<th>Item</th>
<th>Grade/Rating</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lumber 2&quot; nominal thickness or greater</td>
<td>No. 2 Structural or Better</td>
<td>Spruce-Hemlock-Fir</td>
</tr>
<tr>
<td>Lumber less than 2&quot; nominal thickness</td>
<td>No. 2 Common</td>
<td>Spruce-Hemlock-Fir</td>
</tr>
<tr>
<td>Plywood Sheathing</td>
<td>APA Rated sheathing Exposure 1, APA C-D plugged, exterior glue</td>
<td>Group 1 Species</td>
</tr>
<tr>
<td>Treated Wood</td>
<td>ACQ 0.40 pcf Pressure Treated, SPC Select and No. 1 Grade, kiln-dried following treatment</td>
<td>Southern Pine</td>
</tr>
</tbody>
</table>
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F. Fire Retardant Treated Lumber for Interior Use: Where indicated, provide lumber located at interior of building fire retardant treated in conformance with AWPA C20, Type A. Provide fire retardant treatment which, yields a flame spread rating of not more than 25 when tested in accordance with ASTM E 84 kiln dried after treatment to maximum moisture content of 19%.

G. Adhesive for glued construction shall conform to APA Performance Specification AFG-01.

H. Plywood Roof Sheathing
   1. Plywood shall conform to U.S. Product Standard PS 1-95 and shall carry the grade trademark of The Engineered Wood Association - APA. Only APA BC EXT or APA AC EXT grades are acceptable.
   2. Plywood with solid, plugged cross bands under the face veneer.
      a. Unacceptable Grades, including APA C-D EXT, APA C-C EXT, Exposure 1 markings, oriented strand board (OSB), waferboard, southern yellow pine and Lauan or Mahogany plywood are not acceptable.
   3. Plywood Grading: Comply with Product Standard PS 1, "Construction and Industrial Plywood".
   4. Certification and Marking: The producer shall include a Certificate of Inspection with each shipment. Grade mark each panel in compliance with applicable standards of Product Standard PS 1.
   5. Moisture Content: Provide plywood which has been seasoned by kiln drying to a moisture content not to exceed 19%.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: Comply with AWPA C2 (lumber) and AWPA C9 (plywood) and the following for woodwork items indicated to receive pressure preservative treatment. Mark each treated item with the AWPB or SPIB Quality Mark Requirements.
   1. Preservative Chemicals: Pressure-impregnate woodwork with preservative chemicals acceptable to authorities having jurisdiction and containing no arsenic or chromium. Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants in solution to distinguish treated material from untreated material.
   2. Pressure-treat above ground items with preservatives to a minimum retention of 0.25 lb/cu. ft. (4.0 kg/cu. m). Kiln-dry lumber and plywood to a maximum moisture content, respectively, of 19 and 15 percent.

B. Extent of Treatment: As indicated on Drawings or required by regulation or Authorities Having Jurisdiction.
2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where indicated, use materials impregnated with fire-retardant chemical formulations indicated by a pressure process or other means acceptable to authorities having jurisdiction to produce products with fire-test-response characteristics specified.

B. Fire-Retardant Chemicals: Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants in solution to distinguish treated material from untreated material.

C. Fire-Retardant-Treated Lumber: Comply with the following:
   1. Organic-Resin-Based Formulation: Exterior type per AWPA C20, consisting of organic resin solution, relatively insoluble in water, thermally set in wood by kiln drying.
   2. Mill lumber before treatment and implement special procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of treated woodwork.
   3. Kiln-dry material before and after treatment to levels required for untreated material.
   4. Discard treated material that does not comply with requirements of referenced woodworking standard. Do not use twisted, warped, bowed, discolored, or otherwise damaged or defective material.
   5. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
      a. Exterior Fire-X; American Wood Treaters, Inc.
      b. Exterior Fire-X; Hoover Treated Wood Products, Inc.

D. Extent of Treatment: As indicated on Drawings or required by regulation or Authorities Having Jurisdiction.

2.4 INSTALLATION MATERIALS

A. Blocking, Shims, and Nailers: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.

B. Screws: Select material, type, size, and finish required for each use, nonferrous metal or hot-dip galvanized, unless otherwise indicated. Comply with ASME B18.6.1 for applicable requirements.
   1. For metal framing supports, provide screws as recommended by metal-framing support manufacturer.

C. Nails: Select material, type, size, and finish required for each use. Comply with Fed. Spec. FF-N-105 for applicable requirements.
D. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous metal or hot-dip galvanized anchors and inserts, unless otherwise indicated. Provide toothed steel or lead expansion bolt devices for drilled-in-place anchors.

2.5 ROUGH HARDWARE

A. Provide all rough hardware required to complete this work and to attach this work in a secure and rigid manner to work of this and other trades, including all inserts, anchors, anchor bolts, lag bolts, screws, washers, nuts, nails, and other rough hardware. Assist other trades as necessary in the placement of inserts and anchor bolts in concrete and masonry and furnish full instructions regarding locations, sizes, and other requirements of the items in order that they may properly prepare their work to receive same. Rough hardware shall comply in all respects with requirements of the governing laws and codes.

B. Rough hardware items for use at roof framing, blocking, nailers, etc., and other exterior uses, and to be exposed in the finished interior work, shall be hot-dip galvanized zinc or cadmium-plated steel, or stainless steel in accordance with ASTM A 153, or non-ferrous, as indicated or as approved by Architect. Galvanizing shall conform to ASTM A 153. Concealed interior nails shall be bright. Other concealed items shall be cadmium plated or zinc chromate plated. Rough hardware items shall be of appropriate type and of proper capacity and size as required for each specific application.

C. Unless otherwise called out, wood framing, blockings, nailers, etc., of 2 in. nominal thickness or greater shall be bolted to back-up material with 1/2 in. bolts (galvanized at exterior locations and at roofs) located 4 in. from ends and splices, and spaced not greater than 32 in. on center along lengths of the members, to develop positive and secure anchorage to the back-up material. Nails shall be of sufficient length to penetrate the receiving member a minimum of 1-1/2 in.

D. Unless otherwise called out, wood framing, nailers, furring, etc., less than 2 in. nominal thickness shall be secured to back-up material by use of appropriate fasteners located 4 in. from ends and spaced not greater than 16 in. on center along lengths of the members. Type and length of fastening devices shall be such as to develop positive and secure anchorage to the back-up material.

2.6 METAL CONNECTORS AND ANCHORS FOR WOOD AND TIMBER

A. Provide all metal connectors and anchors for wood and timber connections and anchorage as indicated or as required by applicable Codes and Standards and acceptable to local authorities having jurisdiction.

B. Unless otherwise indicated metal connectors and anchors shall be manufactured by the following, or approved equal:
1. The Simpson Strong-Tie Company, Dublin CA 94568; tel. 925-560-9000.
2. USP Structural Connectors (USP), Montgomery, MN; telephone 1-800-328-5934.

C. Metal Connectors and Anchors: Metal connectors and anchoring devices shall be recognized by most product evaluation agencies and shall meet applicable Codes. Agencies that recognize products include ICC-ES (formerly ICBO, BOCA, SBCCI).
   1. Provide prefabricated 16 gauge galvanized steel joist hangers, anchors, and ties manufactured by The Simpson Strong-Tie Company, or equivalent products manufactured by USP, Heckman Building Products or Harlem Metal Products, Inc.
   2. Provide minimum 18 gauge galvanized steel post anchors, timber connectors, joist hangers and supports, hurricane tie-downs and plywood nailing clips as indicated on Drawings, manufactured by The Simpson Strong-Tie Company, Heckman Building Products, Inc., United Steel Products Company, Teco, or approved equal.

D. Finish on Metal Connectors and Anchors:
   1. Generally Metal connectors used in interior environments to be shop finished with applied corrosion resistant coating or galvanized.
   2. Metal connectors in contact with treated lumber materials in an exterior wet environment:
      a. Hot dipped galvanized per ASTM A 653 total both sides. Minimum coating for galvanizing shall be 1.85 oz. zinc per sq. ft. equal to Simpson Strong-Tie ‘ZMAX’ (G185).
      b. Products that are 14 ga. and thicker shall be hot dipped galvanized per ASTM A 123 total both sides. Minimum coating for galvanizing shall be 2.0 oz. zinc per sq. ft. equal to Simpson Strong-Tie ‘Hot Dip Galvanized HDG.’
      c. Fasteners to be used with these products shall meet specifications of ASTM A 153.

PART 3 – EXECUTION

3.1 INSTALLATION, GENERAL

A. Discard units of material with defects that impair quality of carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.

B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
C. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.

D. Fastening: Securely attach rough carpentry work to substrate by anchoring and fastening as indicated.
   1. Fastening of rough carpentry work shall conform to requirements of the governing laws and codes.
   2. Where nailing is indicated, use common wire nails, unless otherwise indicated.
   3. Countersink nail heads on exposed carpentry work and fill holes.
   4. Select fasteners of size that will not penetrate members where opposite side is exposed or will receive finish materials.
   5. Install fasteners without splitting wood; predrill as required. Securely attach carpentry work as indicated and according to applicable codes and recognized standards.
   6. Wood shall be secured to wood substrates and other wood to wood connection with nails spaced 12 in. on center maximum staggered along the centerline of the member being installed. All nail heads must be flush with the top surface.
   7. Nailing of plywood sheathing shall be in strict accordance with the published specifications and recommendations of the APA - The Engineered Wood Association (f/k/a American Plywood Association).
      a. Plywood roof sheathing shall be nailed at 4 in. o.c. at edges and 8 in. o.c. at intermediate supports, or as indicated on the Structural Drawings.
      b. All plywood sheathing shall be blocked at edges or where approved, plywood clips may be used.
   8. Plywood roof sheathing: Install as indicated on the Drawings and as recommended by overlayment (Metal roofing) manufacturer.

E. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to relative humidity conditions existing during time of fabrication and in installation areas.

F. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
   1. Edges of solid-wood (lumber) members 3/4 inch thick or less: 1/16 inch.
   2. Edges of rails and similar members more than 3/4 inch thick: 1/8 inch.

G. Complete fabrication, including assembly, finishing, and hardware application, before shipment to Project site to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

H. Shop-cut openings, to maximum extent possible, to receive hardware, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Smooth
edges of cutouts and seal edges with a water-resistant coating suitable for exterior applications.

3.2 ROUGH CARPENTRY WORK

A. No attempt is made in this Specification to list the various elements of rough carpentry work, as the major part of the work to be done is clearly shown on or reasonably inferred from the Drawings. The rough carpentry work required shall include all such work, regardless of whether or not each and every item is specifically called for. Refer to Drawings to determine the major extent of the rough carpentry work required.

B. The Contractor shall be responsible for structural integrity, connections, and anchorage of all rough carpentry work.

C. Discard units of material which are unsound, warped, bowed, twisted, improperly treated, not adequately seasoned, or too small to fabricate with minimum number of joint or optimum jointing arrangements, or which are of defective quality with respect to surfaces or sizes.

D. Refer to FM Data Sheet 1-49 concerning spacing requirements for perimeter blocking anchorage. All anchors and fasteners that attach wood blocking to the structure shall have their spacing halved for an 8 ft. length away from all exterior corners of the perimeter.

E. Butt joints in wood shall be flush to provide a smooth, uniform line with no irregularities.

F. Built-up blocking shall have butt joints staggered 4 in. minimum layer to layer. The minimum length of any individual piece of woodwork shall be 12 in. All lengths of woodwork shall have a minimum of four fasteners.

G. Construct all rough carpentry work plumb, level, and true with tight, close fitting joints, securely attached and braced to surrounding construction, all in a first class workmanlike manner. Counter-bore for bolt heads, nuts, and washers where required to avoid interference with other materials.

H. Engineered Lumber: Fastening (nailing or bolting) of LVL, PSL, and I-joist (AJS) and Rim Board members shall be in accordance with all codes and in accordance with the engineered lumber manufacturer’s recommended details and instructions. Where required, provide backup calculations for all connections and fastenings. Refer to Structural Drawings.

I. Structural members shall be full-length without splices, and spaced not farther than 16 in. on center, except as may be otherwise specifically indicated on the Drawings.
J. Wood framing members shall be one-piece full length for maximum strength. Wood blockings, edgings, nailers, etc., shall be installed as indicated or specified and shall be furnished in not less than 12 ft. lengths, except where shorter lengths are required.

K. Wood blockings, nailers, edgings, etc., shall be installed as indicated or specified and shall be furnished in lengths not less than 12 ft., except where shorter lengths are required.
   1. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
   2. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

L. Install all wood grounds required at gypsum wallboard work, including those required by other trades to properly attach their work, such as grounds to assure proper lines and levels and for attachment of fixtures, louvers, grilles, registers, diffusers, etc. Do not, however, include fixture support blockings at steel stud framed or furred gypsum wallboard finished walls or partitions as work of this Section.

M. If nailing, drilling, or powder-driving into concrete or masonry causes puncturing of conduits, pipes, ducts, etc., embedded in such work, repair all damage so caused.

N. Miscellaneous Items: Install all rough carpentry work and other miscellaneous items throughout, as indicated on the Drawings and as required to satisfactorily complete the entire work, whether or not each and every required piece is specifically indicated on the Drawings.

3.4 COMPLETION

A. Just prior to completion of work of this Section, inspect work in the company of Architect and make adjustments and corrections to work leaving operating parts in perfect operating condition, all jointing to adjacent material tight, all surfaces without blemishes or stains, all work properly executed and complete, and all defects and damaged work replaced or corrected.

3.5 CLEAN UP

A. As work progresses, and at the end of each day's work, remove scraps of wood, loose fasteners, and other debris; sweep clean; and leave the work area safe and free of debris such as screws and nails that may damage other Work in place.

END OF SECTION
PART 1 – GENERAL

1.1 GENERAL PROVISIONS

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

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
   1. Interior standing and running trim.
   2. Anchors and fasteners for finish work and components.

B. Related Work: The following items are not included in this Section and are specified under the designated Sections:
   1. Section 06 10 00 - ROUGH CARPENTRY for wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.
   2. Section 08 11 00 - HOLLOW METAL DOORS AND FRAMES
   3. Section 08 14 00 - FLUSH WOOD DOORS
   4. Section 08 31 10 - ACCESS DOORS AND FRAMES
   5. Section 08 71 00 - DOOR HARDWARE for hardware to be installed on doors.
   6. Section 08 80 00 - GLAZING for trim at interior vision panels.
   7. Section 10 14 00 – SIGNAGE trim associated with new Signage.
   8. Section 12 35 30 - KITCHEN CASEWORK for trim associated with new Kitchen Casework.

1.3 REFERENCES

A. Cellular PVC Exterior Trim
   1. ASTM D792 - Density and Specific Gravity of Plastics by Displacement.
   2. ASTM D570 - Water Absorption of Plastics.
   5. ASTM D1761 - Mechanical Fasteners in Wood.
   7. ASTM D256 - Determining the Pendulum Impact Resistance of Plastics.
9. ASTM D635 - Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.

1.4 SUBMITTALS

A. Product Data: For each type of product specified, including hardware and accessories, and finishing materials and processes.
   1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large scale details, attachment devices, and other components.
   1. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
   2. Show locations and sizes of cutouts and holes for plumbing fixtures, electrical components and other items installed in architectural woodwork.
   3. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.

C. Samples for Verification:
   1. Lumber with or for transparent finish, not less than 5 inches wide by 12 inches long for each species and cut, finished on 1 side and 1 edge.

D. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

E. Qualification Data: For Installer and fabricator.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a certified participant in AWI's Quality Certification Program.

B. Installer Qualifications: Certified participant in AWI's Quality Certification Program.

C. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork with sequence-matched wood veneers.
D. Quality Standard: Unless otherwise indicated, comply with AWI/AWMAC/WI's "Architectural Woodwork Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.  
1. Provide AWI Quality Certification Program labels and certificates indicating that woodwork, including installation, complies with requirements of grades specified.

E. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.

F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.  
1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article below.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.  
1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.
2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.7 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior and exterior architectural woodwork can be supported and installed as indicated.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Recycled Content of Medium-Density Fiberboard and Particleboard: Provide products with an average recycled content so postconsumer recycled content plus one-half of pre-consumer recycled content is not less than 25%.

B. Certified Wood: Materials shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

C. General: Provide materials that comply with requirements of AWI/AWMAC/WI's "Architectural Woodwork Standards" for each type of woodwork and quality grade specified, unless otherwise indicated.

D. Wood Veneers and Lumber: Provide AWI Premium Grade materials and workmanship.
   1. Provide AWI Lumber Grade 1 and AWI Grade A Veneer, book-matched, minimum 6 inch face veneer width. Kiln dry to 6-8 percent moisture content. Components shall be free of defects and sapwood. Match adjacent pieces for color and grain pattern.
   2. Single-Source Requirement for Wood Veneers and Solids: Intent is to provide wood which matches as closely as possible throughout the project. Provide wood veneers and solids from the same distributor, and from the same flitches and solids sources to the greatest extent possible.

E. Wood Species and Cut for Transparent Finish: Stained - match existing.

F. Wood Species for Opaque Finish: Any closed-grain hardwood.

G. Wood Products: Comply with the following:
   1. Recycled Content of Medium-Density Fiberboard and Particleboard: Provide products with recycled content.


5. Softwood Plywood: DOC PS 1, Medium Density Overlay.


a. Fasteners:
   i. Fasteners designed for wood trim and wood siding (thin shank, blunt point, full round head).
   ii. Fastener material: Stainless steel.
   iii. Shape: Staples, small brads and wire nails are not acceptable as fastening members.
   iv. Length: Fasteners shall be long enough to penetrate the solid wood substrate a minimum of 1 1/2”.
   v. Standard gun nail meeting the requirements above are acceptable.
   vi. Fastener spacing:
      • Place two (2) fasteners per every framing member or spaced not more than 24 inches o.c. for trim-boards applications.
      • Place one (1) fastener per every framing member or spaced not more than 24 inches o.c. for molding.
      • Trim-boards 12” or wider, as well as sheets, will require additional fasteners.
      • Fasteners shall be installed no more than 2” from the end of each piece.
   vii. Fastener substrate: Fastened into a flat, solid substrate. Do not fasten into hollow or uneven areas.
   viii. Pre-drilling is typically not required unless a large fastener is used or product is installed in low temperatures.

b. Adhesives:
   i. Use glue all PVC to PVC joints such as window surrounds, long fascia runs, etc. with a cellular PCV glue, to prevent joint separation.
   ii. Use glue intended for Exterior Cellular PVC trim. Do not use other types of PVC adhesive products.
   iii. The glue joint shall be secured with a fastener and/or clamped on each side of the joint to allow adequate bonding time.
   iv. Cellular PVC trim glue has a working time of 10 minutes and will fully cure in 24 hours.
   v. Surfaces to be glued should be smooth, clean and in complete contact with each other.

c. Sealants:
   i. Urethane sealant
   ii. Polyurethane based sealants without silicone
   iii. Acrylic based sealants without silicone.
2.2 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this Article, which are acceptable to authorities having jurisdiction, and with fire test-response characteristics specified.

1. Do not use treated materials that do not comply with requirements of referenced woodworking standard or that are warped, discolored, or otherwise defective.
2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
3. Identify fire-retardant-treated materials with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Comply with performance requirements of AWPA C20 (lumber) and AWPA C27 (plywood). Use the following treatment type:

2. Mill lumber before treatment and implement special procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of treated woodwork.
3. Kiln-dry materials before and after treatment to levels required for untreated materials.

C. Fire-Retardant Particleboard: Panels complying with the following requirements, made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 25 or less per ASTM E 84.

2.3 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed steel or lead expansion sleeves for drilled-in-place anchors.

C. Adhesives, General: Do not use adhesives that contain urea formaldehyde.
D. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
1. Wood Glues: 30 g/L.
2. Contact Adhesive: 80 g/L.
3. Special Purpose Contact Adhesive: 250 g/L.

2.4 FABRICATION, GENERAL

A. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

B. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

C. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

D. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

E. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
1. Seal edges of openings in countertops with a coat of varnish.

2.5 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

A. Grade: Custom.

B. Wood Species and Cut: As specified hereinabove.
1. Provide split species on trim that faces areas with different wood species, matching each face of woodwork to species and cut of finish wood surfaces in areas finished.

C. For trim items wider than available lumber, use veneered construction. Do not glue for width.

D. For rails wider or thicker than available lumber, use veneered construction. Do not glue for width or thickness.
E. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.

F. Assemble casings in plant except where limitations of access to place of installation require field assembly.

PART 3 – EXECUTION

3.1 PREPARATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.

B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and back-priming.

3.2 INSTALLATION

A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.

B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.

C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.

D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical treatment manufacturer’s written instructions, including those for adhesives used to install woodwork.

F. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

G. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 60 inches long, except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.
1. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base if finished.

2. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semi-exposed surfaces.

D. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION
PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
   1. Flashing and Sheet Metal

B. Related Work: The following items are not included in this Section and are specified under the designated Sections:
   1. Section 07 92 00 - JOINT SEALANTS for caulking and sealing.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM):
   2. ASTM A653/A653M Specification for Steel Sheet, Zinc-Coated (Galvanized) or A653M Zinc-iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
   3. ASTM A924/A924M Specifications for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
   5. ASTM B32 Specification for Solder Metal.
   7. ASTM B306 Specification for Copper Drainage Tube (DWV).
   8. ASTM B370 Specification for Copper Sheet and Strip for Building Construction.

B. Federal Specification (FS):
2. FS TT-S-1543 Sealing Compound: Silicone Rubber Base (For Calking, Sealing and Glazing in Buildings and Other Structures).


1.4 SUBMITTALS

A. Comply with Section 01 33 00 - Submittal Procedures.

B. Shop Drawings and Product Data:
   1. Submit detailed Shop Drawings of metal flashing and sheet metalwork, including shapes, fastening, terminations and installation details.
   2. Manufacturers' product data for materials and manufactured items.
   3. Initial Selection Samples: Submit samples showing complete range of colors, textures, and finishes available for each exposed material used.
      a. Sheet metal for all exposed flashing, minimum 4 in. long.

1.5 QUALITY ASSURANCE

A. Flashing and sheet metalwork shall be fabricated and installed in accordance with SMACNA Architectural Sheet Metal Manual.

B. Except where otherwise indicated, comply with minimum thickness or gage requirements as specified in SMACNA Architectural Sheet Metal Manual.

C. Source: For each material type required for the work of this section, provide primary materials which are the product of one manufacturer. Provide secondary or accessory materials which are acceptable to the manufacturers of the primary materials.

D. Thermal Movement: Provide systems and connections which allow for thermal movement resulting from ambient temperature range of 120°F.

E. Material Compatibility: Provide flashing and sheet metal materials that are compatible with one another and with adjacent materials under conditions of service and application required, based on documentation, testing and field experience.

F. Provide base flashings, perimeter flashings, detail flashings and component
materials that comply with requirements and recommendations in FMG 1-49 Loss Prevention Data Sheet for Perimeter Flashings; FMG 1-29 Loss Prevention Data Sheet for Above Deck Roof Components; NRCA Roofing and Waterproofing Manual for Construction Details and SMACNA Architectural Sheet Metal Manual for Construction Details, as applicable.

G. Pre-Installation Conference
1. Convene at least one week prior to commencing Work of this section and other Building Envelope sections.
2. Ensure all contractors responsible for creating a continuous plane of water tightness are present.

1.6 COORDINATION

A. Coordinate, flashing, work with trim, sheathing, siding, veneers, air/vapor barrier, foundation waterproofing and drainage systems, windows, doors, louvers, vents, roofing, and other adjoining work to provide a leak-proof, secure, and non-corrosive installation.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Galvanized Sheet Metal: Standard galvanized steel sheet, meeting requirements of ASTM A653/A653M and ASTM A924/A924M, as applicable, with minimum zinc coating of 1.25 ounces per square foot and 0.2 percent copper bearing, and mill phosphatized for maximum paint adherence. Where sheet metal gage is not indicated, provide 24 gage.

B. Stainless Steel: Stainless steel sheet for architectural applications, meeting the requirements of ASTM A167, Type 304 or Type 316, with No. 4 finish. Where stainless steel sheet gage is not indicated, provide 24 gage.

C. Aluminum:
1. Provide ASTM B 209, alloy 3003, temper H14 aluminum for aluminum flashing, and related work, where indicated on Drawings.
2. Finish shall be two-coat 70% Kynar 500.
3. Color as selected by the Architect. From manufacturer’s standard offering.
4. Unless otherwise indicated, provide the following minimum thicknesses:
   a. Miscellaneous Flashing: 0.040 in. (unless otherwise noted).
D. Self-Adhering Sheet Membranes

1. **For use where introduction of bituminous material will not cause an interaction with adjacent coatings, weather barriers, water barrier, vapor barriers, tapes, foams and plastics:**
   a. Material: Cold applied, self-adhering membrane composed of an innovative and proprietary rubberized asphalt adhesive and interwound with a disposable release sheet. An embossed, slip resistant surface is provided on the high performance film with UV barrier properties.
   b. Membrane Thickness: 40 mils (1.02 mm) per ASTM D3767 Method A.
   c. Membrane Tensile Strength: MD 33 lbf/in, CD 31 lbf/inch per ASTM D412 Die C Modified.
   d. Membrane Elongation: 250% per ASTM D412 Die C Modified.
   e. Low Temperature Flexibility: Unaffected at -20°F per ASTM D1970.
   f. Adhesion to Plywood: 5.0 lb/in. width per ASTM D903.
   g. Maximum Permeance: 0.05 perms per ASTM E96.
   h. Maximum Material Weight Installed: 0.22 pounds/sq.ft. per ASTM D461.
   i. Service Temperature: 240°F per ASTM D1204
   j. Adhesive: Rubberized asphalt adhesive containing post-consumer recycled content, contains no calcium carbonate, sand or fly ash.
   k. Exposure: Can be left exposed for a maximum of 120 days from date of installation per ASTM G90 – EMMAqua test.
   m. Code and Standards Compliance: Grace Ice and Water Shield HT meets the following requirements:
      i. ASTM D1970.
      ii. ICC-ES AC 48 Acceptance Criteria for Roof underlayments for use in Severe Climate Areas.

2. **For use adjacent to coatings, weather barriers, water barrier, vapor barriers, tapes, foams and plastics which are sensitive to bituminous and petroleum/solvent based materials:**
   c. Thickness:
      i. Carrier Film: 4 mils.
      ii. Polymeric Membrane: 56 mils.
d. Tensile Strength, ASTM D412, Die C:
   i. Carrier Film: 5,900 psi (40.71 MPa) minimum.
   ii. Polymeric Membrane: 460 psi (3.23 MPa) minimum.
e. Elongation, ASTM D412, Die C: Polymeric Membrane: 971 % minimum.
f. Peel Adhesion, ASTM D903: 11.8 lbf/in. (2068 N/m).
g. Lap Adhesion, ASTM D1876: 8.62 lbf/in. (1508 N/m)
h. Water Vapor Permeability, ASTM E96, Method B: 0.036 perms.
i. Water Absorption, ASTM D570: 0.1 percent, 72 hours maximum.
j. Resistance to Hydrostatic Head: Equivalent to 230.9 feet of water.
l. Exposure to Fungi, Soil Test: Pass, 16 weeks.
m. Color:
   i. Carrier Film: White.
   ii. Polymeric Membrane: Black.

2.2 ACCESSORIES

A. Fasteners:
   1. Fasteners: Stainless steel fasteners meeting corrosion resistance requirements, designed for fastening flashing to substrate.
   2. Use the following guide to determine fastener compatibility:

<table>
<thead>
<tr>
<th>Fastener Metal Base Metal</th>
<th>Zinc &amp; Galvanized Steel</th>
<th>Aluminum &amp; Aluminum Alloys</th>
<th>Steel &amp; Cast Iron</th>
<th>Brasses, Coppers, Bronzes &amp; Monel</th>
<th>Martensitic Stainless Type 410</th>
<th>Stainless Type 302/304, 303, 305</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc &amp; Galvanized Steel</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Aluminum &amp; Aluminum Alloys</td>
<td>1</td>
<td>1</td>
<td>2</td>
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Compatibility Chart
### Compatibility Chart KEY:

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<tr>
<th></th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>The corrosion of the base metal is not increased by the fastener.</td>
</tr>
<tr>
<td>2</td>
<td>The corrosion of the base metal is marginally increased by the fastener.</td>
</tr>
<tr>
<td>3</td>
<td>The corrosion of the base metal is considerably increased by the fastener.</td>
</tr>
<tr>
<td>4</td>
<td>The plating on the fastener is rapidly consumed, leaving the bare fastener metal.</td>
</tr>
<tr>
<td>5</td>
<td>Corrosion of the fastener is increased by the base metal.</td>
</tr>
</tbody>
</table>

Note: Surface treatment and environment can significantly alter activity.

---

### B. Counterflashings and Reglets

1. **Basis-of-Design Product:** MM Systems or a comparable product by one of the following:
   - Fry Reglet Corporation.
   - Hickman, W. P. Company.
   - Metal-Era, Inc.

2. **Counterflashings:** Manufactured units in lengths not exceeding 12 feet designed to snap into reglets and compress against base flashings with joints lapped, from the following exposed metal in thickness indicated:
   - Aluminum, 0.063 inch (1.6 mm) thick.

3. **Reglets:** Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashings indicated with factory-mitered and -welded corners and junctions, from the following exposed metal in thickness indicated:
   - Aluminum, 0.063 inch (1.6 mm) thick.

### C. Elastomeric Sealant: Generic type recommended by manufacturer of metal and fabricator of components being sealed.

### D. Adhesives: Type recommended by flashing or sheet metal manufacturer for
waterproof/weather-resistant seaming and adhesive application of flashing sheet.

E. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of work, matching or compatible with material being installed, noncorrosive, size and gage required for performance.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:

B. Verify that openings and penetrations are in place set, and secured in place.

C. Verify that wood blocking, curbs, and nailers are securely anchored.

D. Verify that barrier systems that will be connected to the flashings or will be protected by the sheet metal are coordinated with the work of this section.

3.2 FLASHINGS - GENERAL

A. Flashings: Except as otherwise shown on the approved shop drawings or specified herein, the workmanship of sheet metal flashing work, method of forming joints, anchoring, cleating, provisions for thermal movement, etc., shall conform to the standard details and recommendations of the sheet metal producer and those of producer organizations and research institutions and associations governing the sheet metal used, in addition to the standards and details set forth in the SMACNA Manual and the roof shingle manufacturer.

3.3 COUNTER FLASHINGS

A. Coordinate installation of counter flashings with installation of base flashings.

1. Insert counter flashings in reglets or receivers and fit tightly to base flashings.

2. Extend counter flashings over base flashings. Lap counter flashing joints and bed with elastomeric sealant.

3. Install reglets at locations indicated securely anchored in position.
3.4  ADJUST AND CLEAN

A. Replace all damaged flashings.

B. Remove debris not part of extra stock from Project site.

3.5  PROTECTING AND CLEANING

A. Protect flashing systems from damage and wear during remainder of construction period.

B. Correct deficiencies in or remove flashing system that does not comply with requirements, repair substrates, and repair or reinstall flashing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean adjacent construction if needed using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION
PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
   1. Through-penetration firestop systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.

B. Related Work: The following items are not included in this Section and will be performed under the designated Sections:
   1. Section 07 92 00 - JOINT SEALANTS for standard joint sealers.
   2. Section 09 21 16 - GYPSUM BOARD ASSEMBLIES
   3. Section 22 00 00 - PLUMBING for piping penetrations.
   4. Section 23 00 00 - HEATING, VENTILATING AND AIR CONDITIONING for duct and piping penetrations.
   5. Section 26 00 00 - ELECTRICAL for cable and conduit penetrations.

1.3 PERFORMANCE REQUIREMENTS

A. General: For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.

B. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated, as determined per ASTM E 814.
C. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.
   1. For piping penetrations for plumbing systems, provide moisture-resistant through-penetration firestop systems.
   2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved, either by installing floor plates or by other means.
   3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each through-penetration firestop system, show each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item. Include firestop design designation of qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated.
   1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.

C. Through-Penetration Firestop System Schedule: Indicate locations of each through-penetration firestop system, along with the following information:
   1. Types of penetrating items.
   2. Types of constructions penetrated, including fire-resistance ratings and, where applicable, thicknesses of construction penetrated.
   3. Through-penetration firestop systems for each location identified by firestop design designation of qualified testing and inspecting agency.

D. Qualification Data: For Installer.

1.5 QUALITY ASSURANCE
A. Installer Qualifications: Either a firm that has been approved by FMG according to FMG 4991 “Approval of Firestop Sub-contractors” or a firm experienced in installing through-penetration firestop systems similar in material, design, or extent to that indicated for this Project, whose work has resulted in construction of a minimum of five projects with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements.

B. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, through one source from a single manufacturer.

C. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:
   1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
   2. Through-penetration firestop systems are identical to those tested per testing standard referenced in "Part 1 Performance Requirements" Article. Provide rated systems complying with the following requirements:
      a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
      b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed in the UL “Fire Resistance Directory.”

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of
manufacture, lot number, shelf life if applicable, qualified testing and inspecting agency's classification marking applicable to Project, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.

C. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined building inspector, if required by authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, through-penetration firestop systems that may be incorporated into the Work include, but are not limited to, those systems indicated in the Through-Penetration Firestop System Schedule at the end of Part 3.
2.2 FIRESTOPPING MATERIALS

A. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

B. Materials: Provide through-penetration firestop systems containing primary materials and fill materials which are part of the tested assemblies indicated in the Through-Penetration Firestop System Schedule at the end of Part 3. Fill materials are those referred to in directories of referenced testing and inspecting agencies as "fill," "void," or "cavity" materials.

C. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated.

2.3 MIXING

A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of work.
Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with firestop system manufacturer's written instructions and with the following requirements:
   1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
   2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
   3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

A. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

C. Install fill materials for firestop systems by proven techniques to produce the following results:
1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.

2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.

3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

A. Inspecting Agency: Engage a qualified, independent inspecting agency to inspect through-penetration firestops. Independent inspecting agency shall comply with ASTM E 2174 requirements including those related to qualifications, conducting inspections, and preparing test reports.

B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

C. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued and firestop installations comply with requirements.

3.5 CLEANING AND PROTECTING

A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.
## 3.6 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

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* No UL-Classified system is available as of August 2003. Engineer Judgment Drawing Required.
NOTES:
1. Job site conditions of each through-penetration firestop system must meet all details of the UL-Classified System selected.
2. If job site conditions do not match any UL-classified systems in the schedules above, contact firestop manufacturer for alternative systems or Engineer Judgment Drawings.
3. Coordinate work with other trades to assure that penetration-opening sizes are appropriate for penetrant locations, and vice versa.
4. For 3-hour rated gypsum walls, contact the firestop manufacturer for a UL-classified system or engineer judgment drawing.
5. The Contractor shall verify that the schedule is current at the time of construction, and that each referenced system is suitable for the intended application.

END OF SECTION
PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
   1. Joint sealants and fillers.

B. This Section includes joint sealants for the applications specified with the products in this Section and as indicated on Drawings.

C. Related Work: The following items are not included in this Section and are specified under the designated Sections:
   1. Section 08 80 00 - GLAZING for glazing sealants.
   2. Section 09 21 16 - GYPSUM BOARD ASSEMBLIES for sealing perimeter joints of gypsum board partitions to reduce sound transmission.
   3. Section 09 30 13 – CERAMIC TILING for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
   4. Section 09 90 00 - PAINTING AND COATING

1.3 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

B. Provide joint sealants for interior applications that establish and maintain airtight and water resistant continuous joint seals without staining or deteriorating joint substrates.

1.4 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch wide joints formed between
two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

C. Qualification Data: For Installer.

E. Preconstruction Field Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on preconstruction testing specified in "Quality Assurance" Article.

F. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
   1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
   2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

G. Field Test Report Log: For each elastomeric sealant application.

H. Product Test Reports: Based on comprehensive testing of product formulations performed by a qualified testing agency, indicating that sealants comply with requirements.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer’s authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

C. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
   1. For exterior metal panels, submit two samples of each finish color to manufacturer for testing. Obtain test certificate prior to proceeding with installation.
   2. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
   3. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
   4. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.
D. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to Project joint substrates as follows:

1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.

2. Conduct field tests for each application indicated below:
   a. Each type of elastomeric sealant and joint substrate indicated.
   b. Each type of non-elastomeric sealant and joint substrate indicated.

3. Notify Architect seven days in advance of dates and times when test joints will be erected.
      i. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side.
      ii. Repeat procedure for opposite side.

4. Report whether sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.

5. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

E. Preinstallation Conference:

1. Convene at least one week prior to commencing Work of this section and other Building Envelope sections.

2. Ensure all contractors responsible for creating a continuous plane of water tightness are present.

1.6 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40°F.

2. When joint substrates are wet.

3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.

4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.
1.7  WARRANTY

A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
   1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.

C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
   1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer’s written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
   2. Disintegration of joint substrates from natural causes exceeding design specifications.
   3. Mechanical damage caused by individuals, tools, or other outside agents.
   4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1  MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

B. VOC Content of Interior Sealants: Provide interior sealants and sealant primers that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
   1. Architectural Sealants: 250 g/L.
   2. Sealant Primers for Nonporous Substrates: 250 g/L.
   3. Sealant Primers for Porous Substrates: 775 g/L.

C. Colors of Exposed Joint Sealants: As indicated by manufacturer's designations.
2.2 JOINT SEALANTS

A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

B. Stain-Test-Response Characteristics: Elastomeric sealants shall be non-staining to porous substrates. Provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

C. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

D. Single-Component Neutral-Curing Silicone Sealant:
   1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
      a. GE Silicones; SilPruf NB SCS 9000,. Type: S, Grade: NS, Class: 50, Color: TBD.
      b. Substitutions: Not permitted.
      c. Extent of Use: Joints in exterior vertical and soffit surfaces.

E. Multicomponent Pourable Urethane Sealant:
   1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
      b. Meadows, W. R., Inc.; POURTHANE.
      c. Pecora Corporation; Urexpan NR-200.
      d. Tremco Inc.; THC-901.
      e. Bondaflex Technologies; PUR 2 SL
   2. Extent of Use: Joints in exterior horizontal surfaces.

F. Two-Component, Non-Sag, Polyurethane Elastomeric Sealant:
   1. Multi-Component Urethane: ASTM C 920, Type M, Grade NS, [Class 25] [Class 50]; Uses T, [NT], M, A, and O; two component, chemical curing, nonstaining, nonbleeding, color as selected.
   2. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
      a. Sikaflex® 2c NS EZ Mix
b. Pecora Dynaflex™ Flexible Polyurethane Security Sealant

c. Tremco Dymeric 240FC

F. Single-Component Mildew-Resistant Acid-Curing Silicone Sealant:
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   a. Dow Corning Corporation; 786 Mildew Resistant.
   b. GE Silicones; Sanitary SCS1700.
   c. Tremco Inc.; Tremsil 200.
2. Extent of Use: Sanitary joints at toilet rooms, including between fixtures and walls and at tile joints per TCNA 2012.

G. Latex Sealant: Comply with ASTM C 834, Type P, Grade NF.
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   a. Bostik Findley; Chem-Calk 600.
   b. Pecora Corporation; AC-20+.
   c. Sonneborn, BASF Building Systems; Sonolac.
   d. Tremco Inc.; Tremflex 834.
   e. May National Bondaflex Sil-A 700
2. Extent of Use: Non-moving joints at interior locations.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   b. Tremco Incorporated; Mono 555.
2. Extent of Use: Joints at PVC trim and panels.

2.3 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are non-staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26°F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.
C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.4 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealant and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealant performance.

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

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer’s written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to
produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include concrete, masonry and unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following metal, glass, porcelain enamel and glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer’s written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer’s written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
   1. Place sealants so they directly contact and fully wet joint substrates.
   2. Completely fill recesses in each joint configuration.
   3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
   1. Remove excess sealant from surfaces adjacent to joints.
   2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
   3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

3.4 CLEANING
A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION
A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion.

B. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION
PART 1 – GENERAL

1.1 GENERAL PROVISIONS

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

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
   2. Standard Interior Hollow Metal Doors with Sidelite Frames

B. Related Work: The following items are not included in this Section and are specified under the designated Sections:
   1. Section 08 14 00 - FLUSH WOOD DOORS
   2. Section 08 71 00 - DOOR HARDWARE for door hardware for steel doors.
   3. Section 08 80 00 - GLAZING for glass and fire rated glass in doors.
   4. Section 09 90 00 - PAINTING AND COATING for field painting steel doors and frames.

1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions, core descriptions, label compliance, fire-resistance rating, temperature-rise ratings, and finishes for each type of steel door and frame specified.

B. Shop Drawings:
   1. Elevations of each door design.
   2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
   3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
   4. Locations of reinforcement and preparations for hardware.
   5. Details of each different wall opening condition.
   6. Details of anchorages, joints, field splices, and connections.
   7. Details of accessories.
   8. Details of moldings, removable stops, and glazing.
9. Details of conduit and preparations for power, signal, and control systems.

C. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.

D. Qualification Data: For Installer.

E. Product Test Reports: Based on evaluation of comprehensive fire tests performed by a qualified testing agency, for each type of standard steel door and frame.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Source Limitations: Obtain standard steel doors and frames through one source from a single manufacturer.

C. Fire-Rated Door and Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated.
   1. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450°F above ambient after 30 minutes of standard fire-test exposure.
   2. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are classified and labeled by UL, for fire ratings indicated, based on testing according to NFPA 252. Assemblies must be factory-welded or come complete with factory-installed mechanical joints and must not require job site fabrication.

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver doors and frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch-high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.7 COORDINATION

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

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Amweld Building Products, LLC.
2. Ceco Door Products; an ASSA ABLOY Group Company.
3. CURRIES Company; an ASSA ABLOY Group Company.
4. de LaFontaine
5. Mesker Door Inc.
7. Philipp Manufacturing Company.
9. Steelcraft; an Ingersoll-Rand company.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A60 metallic coating.
D. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.
   1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

F. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal frames of type indicated.

G. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density; with maximum flame-spread and smoke-development indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

I. Glazing: Comply with requirements in Section 088000 - GLAZING.

J. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDARD STEEL DOORS

A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces, unless otherwise indicated. Comply with ANSI A250.8.
   1. Design: Flush panel.
   2. Core Construction: Manufacturer’s standard kraft-paper honeycomb, core that produces doors complying with ANSI A250.8.
      a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
      b. Thermal-Rated (Insulated) Exterior Doors: Provide doors with U Factor of 0.37 or better.
   3. Top and Bottom Edges: Closed with flush or inverted 0.042-inch-thick end closures or channels of same material as face sheets.
C. Face Sheets: Fabricate from cold-rolled steel sheet, unless otherwise indicated to comply with interior door requirements. Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical endurance level:
1. Level 2 and Physical Performance Level B (Heavy Duty), Model 2 (Seamless), 1-3/4 inches thick, 20 gage factory primed steel.

C. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

D. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.4 INSULATED ACOUSTICAL STEEL DOORS

A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces, unless otherwise indicated. Comply with ANSI A250.8.
1. Design: Flush panel.
2. Core Construction: Manufacturer’s standard polyurethane core that produces doors complying with ANSI A250.8.
   a. Face sheets shall be totally supported by a foamed-in-place polyurethane core.
   b. The core insulation material shall fill the entire door cavity and be chemically bonded to all interior surfaces. Density of foam exceeds 1.8 pcf and shall have a crush strength of not less than 3,600 psf.
   c. Per ASTM C518 - Core R-Value: 11.01; Core U-value: 0.091.
3. Top and Bottom Edges: Closed with flush or inverted 0.042-inch-thick end closures or channels of same material as face sheets.
5. STC Rating: 35 Minimum

B. Face Sheets: Fabricated from hot-dipped galvanized steel conforming to ASTM A924 and A653 steel sheet. Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:
1. Level 3 and Physical Performance Level A (Extra Heavy Duty), 16 gage A60 galvanized steel, factory primed.

C. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
2.5 STANDARD STEEL FRAMES

A. General: Comply with ANSI A250.8 and with details indicated for type and profile.

   1. Fabricate frames with full profile welded joints.
   2. Frames for Level 3 Steel Doors: 0.067-inch-thick steel sheet.
   3. Welded frame required
   4. A60 galvanized finish, factory primed,

C. Interior Frames: Fabricated from cold-rolled steel sheet, unless otherwise indicated to comply with exterior frame requirements.
   1. Knocked down frames are permitted for use on interior only.
   2. Frames for Level 2 Steel Doors: 0.053-inch-thick steel sheet.

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

2.6 FRAME ANCHORS

A. Jamb Anchors:
   1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
   2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
   3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
   4. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:
   1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
   2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.
2.7 STOPS AND MOLDINGS

A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch thick, fabricated from same material as door face sheet in which they are installed.

B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.

C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch thick, fabricated from same material as frames in which they are installed.

2.8 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch-wide steel.

C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

2.9 FABRICATION

A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.

C. Hollow Metal Doors:
   1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
   2. Glazed Lites: Factory cut openings in doors.
   3. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.

D. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
1. Full Profile Welded Frames: Weld joints continuously; grind, fill, dress, and make smooth, flush, and not visible. Knocked down frames are permitted for interior frames.

2. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as doorframe. Fasten members at crossings and to jambs by butt welding.

3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

4. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.

5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.

6. Jamb Anchors: Provide number and spacing of anchors as follows:
   a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
      i. Two anchors per jamb up to 60 inches high.
      ii. Three anchors per jamb from 60 to 90 inches high.
      iii. Four anchors per jamb from 90 to 120 inches high.
      iv. Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
   b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
      i. Three anchors per jamb up to 60 inches high.
      ii. Four anchors per jamb from 60 to 90 inches high.
      iii. Five anchors per jamb from 90 to 96 inches high.
      iv. Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
      v. Two anchors per head for frames above 42 inches wide and mounted in metal-stud partitions.
   c. Compression Type: Not less than two anchors in each jamb.
   d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c. 7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
      i. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
      ii. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.

F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Section 087100 – DOOR HARDWARE.
   1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
   2. Reinforce doors and frames to receive non-templated, mortised and surface-mounted door hardware.
   3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.

2.10 STEEL FINISHES

A. Prime Finish: Apply manufacturer's standard epoxy primer immediately after cleaning and pretreating.
   1. Shop Primer: Manufacturer’s standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.
   2. Refer to Section 099000 – PAINTING AND COATING for field-applied coating.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

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

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:
1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer’s written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.
1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
   a. At fire-protection-rated openings, install frames according to NFPA 80.
   b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
   c. Install frames with removable glazing stops located on secure side of opening.
   d. Install door silencers in frames before grouting.
   e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
   f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
   g. Field apply bituminous coating to backs of frames that are filled with grout.
2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.


4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.

5. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.

6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.

7. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.

8. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.

9. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
   a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
   b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
   c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
   d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
   1. Non-Fire-Rated Standard Steel Doors:
      a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
      b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
      c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
   2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors according to NFPA 105.

D. Glazing: Comply with hollow metal manufacturer’s written instructions.
   1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer’s written instructions.

END OF SECTION
PART 1 – GENERAL

1.1 GENERAL PROVISIONS

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

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
1. Solid-core doors with wood-veneer and medium-density overlay faces.
2. Factory finishing for wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Work: The following items are not included in this Section and are specified under the designated Sections:
1. Section 08 11 00 - HOLLOW METAL DOORS AND FRAMES
2. Section 08 71 00 - DOOR HARDWARE for hardware for wood doors.
3. Section 08 80 00 - GLAZING for glazing.
4. Section 09 90 00 - PAINTING AND COATING for field finishing of wood doors.

1.3 SUBMITTALS

A. Product Data: For each type of door. Include details of core and edge construction and trim for openings. Include factory-finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
1. Indicate dimensions and locations of mortises and holes for hardware.
2. Indicate dimensions and locations of cutouts.
3. Indicate requirements for veneer matching.
4. Indicate doors to be factory finished and finish specifications.

C. Samples for Verification:
1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches for each material and finish. For each wood species and transparent finish, provide set of three samples showing typical range of color and grain to be expected in the finished work.
1.4QUALITY ASSURANCE
A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.
B. Quality Standard: Comply with AWI/AWMAC/WI's "Architectural Woodwork Standards."

1.6 SUBMITTALS
C. Fire-Rated Wood Doors: Doors 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.
D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01.
E. Installer Qualifications
F. Submit a copy of the product warranty to be applied to this project.

1.5 DELIVERY, STORAGE, AND HANDLING
A. Comply with requirements of referenced standard and manufacturer's written instructions.
B. Package doors individually in plastic bags.
C. Mark each door on top and bottom edge with opening number used on Shop Drawings.

1.6 PROJECT CONDITIONS
A. Environmental Limitations: Do not deliver or install doors until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.7 WARRANTY
A. Special Warranty: Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, have warped (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section, or show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
2. Warranty shall be in effect during the following period of time from date of Substantial Completion:
PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Flush Wood Doors:
      a. Algoma Hardwoods Inc.
      b. Eggers Industries; Architectural Door Division.
      c. Lambton Doors.
      d. Marshfield Door Systems.
      e. VT Industries Inc.

2.2 DOOR CONSTRUCTION, GENERAL

A. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that contain no added urea formaldehyde.

B. Doors for Transparent Finish:
   1. Grade: AWI Premium, with AWI Grade A faces.
   2. Species and Cut: Quarter Sawn White Oak
   4. Assembly of Veneer Leaves on Door Faces: Center balanced.
   5. Stiles: Same species as faces.

C. Doors for Opaque Finish:
   1. Grade: Premium.
   2. Faces for Interior Doors: Medium-density overlay.
   3. Apply medium-density overlay directly to high-density hardboard crossbands.

2.3 SOLID-CORE DOORS

A. Cores: Comply with the following requirements:
   1. Particle Core: ANSI A 208.1, Grade 1-LD-2
   2. Stave Lumber Core
   3. Agrifiber Core: ANSI A 208.1, Grade 1-LD-2
   4. Structural Composite Lumber Core: Timberstrand LSL.
   5. Provide doors with structural composite lumber cores instead of particleboard cores at locations where exit devices are indicated or where cutouts exceed 40% of the door area.
B. Interior Veneer-Faced Doors:
   1. Construction: Five plies, hot-pressed, with stiles and rails bonded to core, then entire unit abrasive planed before veneering.

C. Fire-Rated Doors:
   1. Construction: Construction and core specified above for type of face indicated or manufacturer’s standard mineral-core construction as needed to provide fire rating indicated.
      a. Fire Retardant Mineral Core, with added urea formaldehyde free cross-banding.
   2. Blocking: For mineral-core doors, provide composite blocking with improved screw-holding capability approved for use in doors of fire ratings indicated as needed to eliminate through-bolting hardware.
   3. Edge Construction: At hinge stiles, provide manufacturer’s standard laminated-edge construction with improved screw-holding capability and split resistance and with outer stile matching face veneer.
   4. Pairs: Provide fire-rated pairs with fire-retardant stiles matching face veneer that are labeled and listed for kinds of applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals.

2.4 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances.
   1. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements in NFPA 80 for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings DHI A115-W series standards, and hardware templates.
   1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining. Drill pilot holes for screws for butt hinges and lock fronts at the factory.
   2. Metal Astragals: Pre-machine astragals and formed-steel edges for hardware for pairs of fire-rated doors to receive concealed vertical rod exit devices.

2.6 SHOP PRIMING

A. Doors for Opaque Finish: Shop prime faces and edges of doors, including cutouts, with one coat of wood primer specified in Section 099000 - PAINTING AND COATING.
2.7 FACTORY FINISHING

A. General: Comply with AWI's "Architectural Woodwork Quality Standards Illustrated" for factory finishing.

B. Finish doors at factory that are indicated to receive transparent finish. Factory prime and prepare for field finish doors indicated to receive opaque finish.

C. Transparent Finish:
   1. Grade: Premium.
   3. Staining: As selected by Architect from manufacturer's full range.
   4. Effect: Semifilled finish.
   5. Sheen: Satin.

D. Opaque Finish:
   1. Grade: Premium.
   2. Finish: Manufacturer's standard conversion varnish finish with performance comparable to AWS System 5.
   3. Color: As selected by Architect from manufacturer's full range.

PART 3 - ERECTION

3.1 EXAMINATION

A. Examine doors and installed door frames before hanging doors.
   1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
   2. Reject doors with defects.

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

3.2 INSTALLATION

A. Hardware: For installation, see Section 08 71 00 - DOOR HARDWARE.

B. Manufacturer's Written Instructions: Install doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.
1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Protection: 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.

C. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION
PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
   1. Access doors and frames for walls and ceilings were required.
   2. Provide pre-finished products when possible

B. Related Work: The following items are not included in this Section and are specified under the designated Sections:
   1. Section 02 41 13 - SELECTIVE DEMOLITION
   2. Section 06 10 00 - ROUGH CARPENTRY
   4. Section 09 21 16 - GYPSUM WALLBOARD ASSEMBLIES
   4. Section 22 00 00 - PLUMBING

1.3 SUBMITTALS

A. Product Data: For each type of access door and frame indicated. Include construction details, fire ratings, materials, individual components and profiles, and finishes.

B. Shop Drawings: Show fabrication and installation details of access doors and frames for each type of substrate. Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each door face material, at least 3 by 5 inches in size, in specified finish.

D. Access Door and Frame Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

E. Ceiling Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted items including access doors and frames, lighting fixtures,
diffusers, grilles, speakers, sprinklers, and special trim are shown and coordinated with each other.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of access door and frame through one source from a single manufacturer.

B. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics per the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
   1. NFPA 252 for vertical access doors and frames.
   2. ASTM E 119 for horizontal access doors and frames.

C. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.

1.5 COORDINATION

A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, or other concealed work, and indicate in the schedule specified in "Submittals" Article.

PART 2 - PRODUCTS

2.1 STEEL MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
   1. ASTM A 123/A 123M, for galvanizing steel and iron products.
   2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

B. Steel Sheet: Electrolytic zinc-coated, ASTM A 591/A 591M with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.

C. Steel Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
   1. Surface Preparation for Steel Sheet: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."

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ACCESS DOORS AND FRAMES
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2. Factory-Primed Finish: Apply shop primer immediately after cleaning and pretreating.

D. Drywall Beads: Edge trim formed from 0.0299-inch zinc-coated steel sheet formed to receive joint compound and in size to suit thickness of gypsum board.

2.2 STAINLESS-STEEL MATERIALS

A. Rolled-Stainless-Steel Floor Plate: ASTM A 793, manufacturer's standard finish.

B. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 316. Remove tool and die marks and stretch lines or blend into finish.
   1. Finish: Directional Satin Finish, No. 4.

2.3 INTERIOR GYPSUM WALL AND ACOUSTICAL TILE ACCESS DOORS AND FRAMES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Acudor Products, Inc.
   2. Babcock-Davis; A Cierra Products Co.
   4. J. L. Industries, Inc.
   7. Milcor Inc.
   8. Nystrom, Inc.

B. Flush Access Doors and Trimless Frames: Fabricated from steel sheet at typical areas and from stainless-steel sheet at toilet and wet areas.
   1. Locations: Wall and ceiling surfaces.
   2. Door: Minimum 0.060-inch-thick sheet metal, set flush with surrounding finish surfaces.
   3. Frame: Minimum 0.060-inch-thick sheet metal with drywall bead flange.
   4. Hinges: Continuous piano.
   5. Lock: Cylinder.
      a. Lock Preparation: Prepare door panel to accept cylinder specified in Section 08 71 00, DOOR HARDWARE.

C. Recessed Access Doors and Trimless Frames: Fabricated from steel sheet at typical areas and from stainless-steel sheet at toilet and wet areas.
   1. Locations: Wall and ceiling surfaces.
2. Door: Minimum 0.060-inch-thick sheet metal in the form of a pan recessed 5/8 inch for gypsum board infill.
3. Frame: Minimum 0.060-inch-thick sheet metal with drywall bead for gypsum board surfaces.
5. Lock: Cylinder.
   a. Lock Preparation: Prepare door panel to accept cylinder specified in Section 08 71 00, DOOR HARDWARE.

D. Insulated, Flush Access Doors and Frames with Exposed Trim: Fabricated from steel at typical areas and from stainless-steel sheet at toilets and wet areas.
   1. Locations: Exterior Ceiling and Wall surfaces.
   2. Door: 20 gauge galvanized steel
   3. Flanged Frame: 6063-T5 extruded aluminum
   4. Door Panel Frame: 6063-T5 extruded aluminum
   5. Hinge: Stainless steel continuous piano hinge
   6. Latch: Keyed handle for outside
   7. Finish: Paint grip
   8. Gasket: Extruded santoprene
   9. Insulation: 2" thick fiberglass Door: Minimum 0.060-inch-thick sheet metal, flush construction.
      a. Lock Preparation: Prepare door panel to accept cylinder specified in Section 08 71 00, DOOR HARDWARE

E. Color of pre-finished products:
   1. When prefished products are available, Architect will select from among the manufacturer’s standard color offerings.

2.4 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.
   1. For trimless frames with drywall bead, provide edge trim for gypsum board and gypsum base securely attached to perimeter of frames.
2. For trimless frames with plaster bead for full-bed plaster applications, provide zinc-coated expanded metal lath and exposed casing bead welded to perimeter of frames.
3. Provide mounting holes in frames for attachment of units to metal or wood framing.
4. Provide mounting holes in frame for attachment of masonry anchors.

D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling.
   1. For recessed doors with plaster infill, provide self-furring expanded metal lath attached to door panel.

E. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
   1. For cylinder lock, furnish two keys per lock and key all locks alike.
   2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.

C. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.2 ADJUSTING AND CLEANING

A. Adjust doors and hardware after installation for proper operation.

B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION
08 41 13
ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 – GENERAL

1.1 GENERAL PROVISIONS

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

1.2 DESCRIPTION OF WORK

B. This Section includes Aluminum Entrances, glass and glazing, and door hardware and components.
   1. Equal to Kawneer Aluminum Entrances include:
      a. 350 Swing Door; Medium stile, 3-1/2" (89 mm) vertical face dimension, 1-3/4" (44.5 mm) depth, high traffic applications.

1.3 Related Work: The following items are not included in this Section and are specified under the designated Sections:
   C. Section 06 20 23 - INTERIOR FINISH CARPENTRY for woodwork repair and replacement.
   D. Section 07 92 00 - JOINT SEALANTS for perimeter sealing of windows to adjacent surfaces.
   E. Section 08 56 80 GLAZING for glass types.
   F. Section 09 90 00 - PAINTING AND COATING for scraping and painting of lintels, applications of coatings and liquid applied finishes.

1.4 Definitions
   Definitions: For fenestration industry standard terminology and definitions refer to American Architectural Manufactures Association (AAMA) – AAMA Glossary (AAMA AG).

1.5 Performance Requirements
   A. General Performance: Aluminum-framed entrance system shall withstand the effects of the following performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.
   B. Aluminum Framed Entrance Performance Requirements:
      1. Wind loads: Provide entrance system; include anchorage, capable of withstanding wind speeds of 139 mph. The design pressures are based on the Massachusetts State Building Code; 780 CMR 9th Edition.
      2. Air Infiltration: For single acting offset pivot or butt hung entrances in the closed and locked position, the test specimen shall be tested in accordance with ASTM E 283 at a pressure differential of 1.57 psf (75 PA) for single and pairs of doors. A single 3'0" x 7'0" (915 mm x
2134 mm) entrance door and frame shall not exceed 1.0 cfm/ft². A pair of 6'0" x 7'0" (1830 mm x 2134 mm) entrance doors and frame shall not exceed 1.0 cfm/ft².

3. Structural Performance: Corner strength shall be tested per the Kawneer dual moment load test procedure and certified by an independent testing laboratory to ensure weld compliance and corner integrity [Testing procedure and certified test results available upon request].

C. Environmental Product Declarations (EPD): Shall have a Type III Product-Specific EPD.

D. Material Ingredient Reporting: Shall have a complete list of chemical ingredients to at least 100ppm (0.01%) that covers 100% of the product, acceptable documentation includes: Manufacturer's inventory with Chemical Abstract Service Registration Number (CASRN or CAS#).
      Cradle to Cradle certification: Either document below is acceptable for this option.
      a. Cradle to Cradle Certified™ with Material Health section Silver or above.
      b. Silver Level or above Material Health Certificate.

Red List Free DECLARE label.

1.6 Submittals

G. Product Data: Include construction details, material descriptions, and fabrication methods, dimensions of individual components and profiles, hardware, finishes, and installation instructions for each type of aluminum-framed entrance door indicated.

1. Recycled Content:
   a. Provide documentation that aluminum has a minimum of 50% mixed pre- and post-consumer recycled content with a sample document illustrating project specific information that will be provided after product shipment.
   b. Once product has shipped, provide project specific recycled content information, including:
      1) Indicate recycled content; indicate percentage of pre- and post-consumer recycled content per unit of product.
      2) Indicate relative dollar value of recycled content product to total dollar value of product included in project.
      3) Indicate location recovery of recycled content.
      4) Indicate location of manufacturing facility.

2. Environmental Product Declaration (EPD).
   a. Include a Type III Product-Specific EPD.

3. Material Ingredient Reporting:
   a. Include documentation for material reporting that has a complete list of chemical ingredients to at least 100ppm (0.01%) that covers 100% of the product.

A. Shop Drawings: Include plans, elevations, sections, details, hardware, and attachments to other work, operational clearances and installation details.
B. Samples for Initial Selection: For units with factory-applied color finishes including samples of hardware and accessories involving color selection.

C. Samples for Verification: For aluminum-framed entrance door and components required.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for each type of aluminum-framed entrance doors.

E. Fabrication Sample: Corner sample consisting of a door stile and rail, of full-size components and showing details of the following:
   1. Joinery, including welds.
   2. Glazing

F. Other Action Submittals:
   1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

1.2 Quality Assurance

G. Installer Qualifications: An installer which has had successful experience with installation of the same or similar units required for the project and other projects of similar size and scope.

H. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum-framed entrance doors and storefronts that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.

I. Source Limitations: Obtain aluminum-framed entrance door through one source from a single manufacturer.

J. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum-framed entrance doors and are based on the specific system indicated. Refer to Division 01 Section “Product Requirements”. Do not modify size and dimensional requirements.

K. 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.

L. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

M. Build mockup for type(s) of swing entrance door(s) indicated, in location(s) shown on Drawings.

N. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section “Project Management and Coordination”.

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ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS
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1.8 Project Conditions
   A. Field Measurements: Verify actual dimensions of aluminum-framed entrance door openings by field measurements before fabrication and indicate field measurements on Shop Drawings.

1.9 Warranty
   A. Manufacturer’s Warranty: Submit, for Owner’s acceptance, manufacturer’s standard warranty.
   B. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by manufacturer.

PART 2 PRODUCTS

2.1 Manufacturers
   A. Basis-of-Design Product:
      1. Kawneer Company Inc.
      2. The door stile and rail face dimensions of the 350 entrance door will be as follows

<table>
<thead>
<tr>
<th>Door</th>
<th>Vertical Stile</th>
<th>Top Rail</th>
<th>Bottom Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>350</td>
<td>3-1/2&quot; (89 mm)</td>
<td>3-1/2&quot; (89 mm)</td>
<td>10&quot; (254 mm)</td>
</tr>
</tbody>
</table>

   3. Major portions of the door members to be 0.125" (3.2) nominal in thickness and glazing molding to be 0.05" (1.3) thick.

   B. Glazing gaskets shall be either EPDM elastomeric extrusions or a thermoplastic elastomer.
   C. Provide adjustable glass jacks to help center the glass in the door opening.
   D. Subject to compliance with requirements, provide a comparable product by the following:
      1. Manufacturer: Tubelite
      2. Series: Standard Medium Stile
      3. Profile dimension: 4” top rail and side stiles; 10” bottom rail
   E. Substitutions: Refer to Substitutions Section for procedures and submission requirements
   F. Pre-Contract (Bidding Period) Substitutions: Submit written requests ten (10) days prior to bid date.
   G. Post-Contract (Construction Period) Substitutions: Submit written request in order to avoid aluminum-framed entrance door installation and construction delays.
   H. Product Literature and Drawings: Submit product literature and drawings modified to suit specific project requirements and job conditions.
   I. Certificates: Submit certificate(s) certifying substitute manufacturer (1) attesting to adherence to specification requirements for aluminum-framed entrance door system performance criteria, and (2) has been engaged in the design, manufacturer and fabrication of aluminum-framed entrance doors for a period of not less than ten (10) years. (Company Name)
J. Test Reports: Submit test reports verifying compliance with each test requirement required by the project.
K. Samples: Provide samples of typical product sections and finish samples in manufacturer's standard sizes.
L. Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.

2.2 Materials

A. Aluminum Extrusions: Alloy and temper recommended by aluminum-framed entrance door manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.090” (2.3 mm) wall thickness at any location for the main frame and door leaf members.
B. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum-framed entrance door members, trim hardware, anchors, and other components.
C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
E. Weather Seals: Provide weather stripping with integral barrier fin or fins of semi-rigid, polypropylene sheet or polypropylene-coated material. Comply with AAMA 701/702.
F. Red List Free: All parts and materials comply with the Living Building Challenge/DECLARE Red List and the Cradle-to-Cradle (C2C) Banned List.
G. PVC free.
H. Neoprene free, or Red List Free: Product does not contain PVC or Neoprene.

2.3 Storefront Framing System

A. Storefront Entrance Framing:
   1. Trifab™ VG 450/451/451T or Trifab™ 451UT.
   2. Thermally Broken Entrance Framing - Kawneer IsoLock™ Thermal Break with a 1/4" (6.4 mm) separation consisting of a two-part chemically curing, high-density polyurethane, which is mechanically and adhesively joined to aluminum storefront sections.
      a. Thermal Break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505.
   3. Non-Brackets and Reinforcements: Manufacturer’s standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
B. Fasteners and Accessories: Manufacturer’s standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposed shall be stainless steel.
C. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.
D. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
E. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle storefront material and components to avoid damage. Protect storefront material against damage from elements, construction activities, and other hazards before, during and after storefront installation.

2.4 Glazing
A. Glazing: As specified in Division 08 Section “Glazing”.
B. Glazing Gaskets: Manufacturer’s standard compression types; replaceable, extruded EPDM rubber.
C. Spacers and Setting Blocks: Manufacturer’s standard elastomeric type.

2.5 Hardware
A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum-framed entrance doors.
D. Standard Hardware:
   1. Weather-stripping:
   2. Meeting stiles on pairs of doors shall be equipped with an adjustable astragal utilizing wool pile with polymeric fin.
   3. The door weathering on a single acting offset pivot or butt hung door and frame (single or pairs) shall be comprised of a thermoplastic elastomer weathering on a tubular shape with a semi-rigid polymeric backing.
   4. Sill Sweep Strips: EPDM blade gasket sweep strip in an aluminum extrusion applied to the interior exposed surface of the bottom rail with concealed fasteners (Necessary to meet specified performance tests).
   5. Threshold: Extruded aluminum, one piece per door opening, with ribbed surface.
E. Continuous Hinge P1584
F. Push/Pull:
G. Exit Device: 3600 Series
H. Closer: Surface
I. Security Lock/Dead Lock: Active Leaf [___________]; Inactive Leaf [___________].
J. Latch Handle
K. Cylinder(s)

2.6 Fabrication
A. Fabricate aluminum-framed entrance doors in sizes indicated. Include a complete system for assembling components and anchoring doors.
B. Fabricate aluminum-framed glass doors that are reglazable without dismantling perimeter framing.
C. Door corner construction shall consist of mechanical clip fastening, SIGMA deep penetration plug welds and 1-1/8” (29 mm) long fillet welds inside and outside of all four corners. Glazing stops shall be hook-in type with EPDM glazing gaskets reinforced with non-stretchable cord.
D. Accurately fit and secure joints and corners. Make joints hairline in appearance.
E. Prepare components with internal reinforcement for door hardware.
F. Arrange fasteners and attachments to conceal from view.
G. Weather-stripping: Provide weather-stripping locked into extruded grooves in door panels or frames as indicated on manufacturer's drawings and details.

2.7 Aluminum Finishes
 Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
Factory Finishing:

PART 3 EXECUTION

3.1 Examination
A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated installation.
B. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
C. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches (76.2 mm) of opening.
D. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Installation
A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing aluminum-framed entrance doors, hardware, accessories, and other components.
B. Install aluminum-framed entrance doors level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
C. Set sill threshold in bed of sealant, as indicated, for weather tight construction.
D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 Field Quality Control
A. Manufacturer's Field Services: Upon Owner’s written request, provide periodic site visit by manufacturer’s field service representative.
3.4 Adjusting, Cleaning, and Protection

A. Clean aluminum surfaces immediately after installing aluminum-framed entrance doors. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

B. Clean glass immediately after installation. Comply with glass manufacturer’s written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.

C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

End of Section
PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to Glass and glazing for the following products and applications:

1. Fire-rated and non-fire rated glazing in door/ sidelite assemblies
2. Unframed mirrors.

B. Related Work: The following items are not included in this Section and are specified under the designated Sections:

1. Section 06 20 00 Finish Carpentry for wood trim as required.
2. Section 09 30 13 Ceramic Tiling for coordinating of wall tile with Toilet Room Mirrors

1.3 DEFINITIONS

A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

D. Deterioration of Coated Glass: Defects developed from normal uses that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

F. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation,
delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project in-service conditions.

C. References:
1. National Fire Protection Association (NFPA):
   d. NFPA 257: Standard on Fire Test for Window and Glass Block Assemblies.
2. Underwriters Laboratories, Inc. (UL):
   b. UL 10B: Fire Tests of Door Assemblies.
   c. UL 10C: Positive Pressure Fire Tests of Door Assemblies.
3. American National Standards Institute (ANSI):

1.5 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Samples: For the following products, in the form of 12-inch- square Samples for glass.
   1. Each type of mirror.
   2. For exposed glazing sealant indicated.
   3. For setting Channel for salvaged glazing installed as butt glazing.
C. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

D. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.

E. Qualification Data: For installers.

G. Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.

H. Product Test Reports: For each of the following types of glazing products:
   1. Mirror Adhesive
   2. Glazing sealants.

I. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance.

B. Source Limitations for Glass: Obtain the following through one source from a single manufacturer for each glass type: clear float glass, laminated glass and insulating glass.

C. Source Limitations for Glass Sputter-Coated with Solar-Control Low-E Coatings: Where solar-control low-e coatings of a primary glass manufacturer that has established a certified fabricator program is specified, obtain sputter-coated solar-control low-e-coated glass in fabricated units from a manufacturer that is certified by coated-glass manufacturer.

D. Source Limitations for Glazing Accessories: Obtain glazing accessories through one source from a single manufacturer for each product and installation method indicated.

E. Elastomeric Glazing Sealant Product Testing: Obtain sealant test results for product test reports in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period.
1. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.

2. Test elastomeric glazing sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.

F. Preconstruction Adhesion and Compatibility Testing: Submit to elastomeric glazing sealant manufacturers, for testing indicated below, samples of each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member that will contact or affect elastomeric glazing sealants:

1. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.

2. Submit not fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.

3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.

4. For materials failing tests, obtain sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.

5. Testing will not be required if elastomeric glazing sealant manufacturers submit data based on previous testing of current sealant products for adhesion to, and compatibility with, glazing materials matching those submitted.

G. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201.

1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.

2. Where glazing units, including Kind FT glass and laminated glass, are specified in Part 2 articles for glazing lites more than 9 sq. ft. in exposed surface area of one side, provide glazing products that comply with Category II materials, for lites 9 sq. ft. or less in exposed surface area of one side, provide glazing products that comply with Category I or II materials, except for hazardous locations where Category II materials are required by 16 CFR 1201 and regulations of authorities having jurisdiction.

H. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements

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are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. **GANA Publications:** GANA Laminated Division's "Laminated Glass Design Guide" and GANA's "Glazing Manual."


3. **IGMA Publication for Sloped Glazing:** IGMA TB-3001, "Sloped Glazing Guidelines."

4. **IGMA Publication for Insulating Glass:** SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."

I. **Insulating-Glass Certification Program:** Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following testing and inspecting agency:

1. Insulating Glass Certification Council.

J. **Preinstallation Conference:** Conduct conference at Project site to comply with requirements in Division 01.

1.7 **DELIVERY, STORAGE, AND HANDLING**

A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. For insulating-glass units that will be exposed to substantial altitude changes, comply with insulating-glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.8 **PROJECT CONDITIONS**

A. **Environmental Limitations:** Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40°F.

1.9 **WARRANTY**

A. **Manufacturer's Special Warranty for Mirror Coated-Glass Products:**

Manufacturer's standard form, made out to the Owner and signed by coated-glass manufacturer agreeing to replace mirror coated glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

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1. Warranty Period: Ten (10) years from date of Substantial Completion.

B. There shall be no warranty on reinstalled salvaged glazing.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
   1. Insulated window glass: Cardinal low-E 272 as per ASTM E 774, Class CBA. Dual seal, aluminum spacer.

B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.
   1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
   2. For uncoated glass, comply with requirements for Condition A.
   3. For coated vision glass, comply with requirements for Condition C (other coated glass).

C. Tempered Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; Kind FT; ¼ inch thick unless indicated otherwise.
   1. Where tempered insulating glass is required, Cardinal low-E 272 as per ASTM E 774, Class CBA. Dual seal, aluminum spacer.

E. Glass Mirrors, General: ASTM C 1503; manufactured using copper-free, low-lead mirror coating process.
   1. Mirror Edge Treatment: Flat polished edge.

D. Fire Rated Glass:
   1. Fire Rated Glazing: ASTM C 1036 and ASTM C 1048
   2. Approximate Visible Transmission: Varies with thickness (approximate range 88 percent).
   3. Logo: Each piece of fire-rated glazing shall be labeled with a permanent logo including name of product, manufacturer, testing laboratory (UL® only), fire rating period, safety glazing standards, and date of manufacture.
   4. Performance: Glass must be rated to stop fire from either direction and must meet all testing requirements including the required hose-stream test (where fire-rating exceeds 20 minutes).
   5. Applicable for installation in impact safety-rated locations.
2.3 GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:
   1. Compatibility: Verify glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, interlayer of laminated glass, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
   2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
   3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full standard range.
   4. Adhesives and sealants that are used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
      a. Structural Glazing Adhesives: 100 g/L.
      b. Architectural Sealants: 250 g/L.

B. Elastomeric Glazing Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
   1. Single-Component Neutral- and Basic-Curing Silicone Glazing Sealants:
      a. Dow Corning Corporation; 999.
      b. GE Silicones; SilPruf LM SC2700.
      c. Tremco Inc.; Spectrem 1.

2.4 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; non-staining and non-migrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for project conditions.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:
1. Type 1, for glazing applications in which tape acts as the primary sealant.
2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.5 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Mirror Mastic: An adhesive setting compound, asbestos-free, produced specifically for setting mirrors and certified by both mirror manufacturer and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed.

G. Butt Glazing Channel: C.R. Laurence Co., Inc. Brushed Stainless finish, anodized, wet glaze 1" Deep U-Channel, width as required.

2.6 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

B. Grind smooth and polish exposed glass edges and corners.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing glazing, with Installer present, for compliance with the following:
   1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
   2. Presence and functioning of weep system.
   3. Minimum required face or edge clearances.
   4. Effective sealing between joints of glass-framing members.

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

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing.

B. Remove coatings not firmly bonded to substrates.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches as follows:
   1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
   2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Wall-Mounted Mirrors: Install mirrors with mastic.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until just before each glazing unit is installed.

F. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place.
against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

3.5 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.6 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.
   1. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
   2. Do not clean with astringent cleaners. Use a clean “grit free” cloth and a small amount of mild soap and water or mild detergent.
   3. Do not use any of the following:
      a. Steam jets
      b. Abrasives
      c. Strong acidic or alkaline detergents, or surface-reactive agents
      d. Detergents not recommended in writing by the manufacturer
      e. Do not use any detergent above 77 degrees F
      f. Organic solvents including but not limited to those containing ester, ketones, alcohols, aromatic compounds, glycol ether, or halogenated hydrocarbons.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than
once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

END OF SECTION
PART 1 – GENERAL

1.01 SUMMARY

A. Section includes furnishing and installation of door hardware for doors specified in “Hardware Sets” and required by actual conditions. Including screws, bolts, expansion shields, electrified door hardware, and other devices for proper application of hardware.

B. Where items of hardware are not specified and are required for intended service, such omission, error or other discrepancy to be submitted to Architect fourteen calendar days prior to bid date for clarification by addendum.

C. Products supplied but not installed under this Section:

D. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

E. Related Divisions:

   1. Section 06 10 00 - ROUGH CARPENTRY
   2. Section 08 11 00 - HOLLOW METAL DOORS AND FRAMES
   3. Section 08 14 00 - FLUSH WOOD DOORS

1.02 REFERENCES

A. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI):

   1. ANSI/BHMA A156.1 Butts & Hinges (2006)
   2. ANSI/BHMA A156.2 Bored & Preassembled Locks & Latches (2011)
   3. ANSI/BHMA A156.3 Exit Devices (2014)
   4. ANSI/BHMA A156.4 Door Controls – Closers (2008)
   5. ANSI/BHMA A156.6 Architectural Door Trim (2010)
   6. ANSI/BHMA A156.7 Template Hinge Dimensions (2009)
   7. ANSI/BHMA A156.12 Interconnected Locks & Latches (2005)
   8. ANSI/BHMA A156.16 Auxiliary Hardware (2008)
  10. ANSI/BHMA A156.21 Thresholds (2009)

B. International Code Council/American National Standards Institute (ICC/ANSI)/ADA:

C. Underwriters Laboratories, Inc. (UL):
   1. UL 10C Positive Pressure Fire Test of Door Assemblies.
   2. UL 1784 Air Leakage Test of Door Assemblies.
   3. UL/ULC Listed.

D. Door and Hardware Institute (DHI):
   2. DHI Publication – Abbreviations and Symbols.

E. National Fire Protection Agency (NFPA):
   1. NFPA 70 National Electrical Code 2008
   2. NFPA 80 Standard for Fire Doors and Other Opening Protectives 2007
   4. NFPA 105 Standard for the Installation of Smoke Door Assemblies 2007

F. Building Codes:
   1. IBC International Building Code 2009
   2. Local Building Code.

1.03 SUBMITTALS

A. Submit in accordance with Conditions of the Contract and Division 1 Administrative Requirements.

B. Shop Drawings:
   1. Organize hardware schedule organized in vertical format illustrated in DHI Publications Sequence and Formatting for the Hardware Schedule. Include abbreviations and symbols page according to DHI Publications Abbreviations and Symbols. Complete nomenclature of items required for each door opening as indicated.
   2. Coordinate final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of hardware.
   3. Architectural Hardware Consultant (AHC), as certified by DHI, who shall affix seal attesting to completeness and correctness, shall review hardware schedule prior to submittal.

C. Submit manufacturer’s catalog sheet on design, grade and function of items listed in hardware schedule. Identify specific hardware item per sheet, provide index, and cover sheet.

D. Coordination: Distribute door hardware templates to related divisions within fourteen days of receiving approved door hardware submittals.

E. Closeout Submittals: Submit to Owner in a three-ring binder or CD if requested.
   1. Warranties.
   3. Maintenance service agreement.
   4. Record documents.
5. Copy of approved hardware schedule.
6. Copy of approved keying schedule with bitting list.
7. Door hardware supplier name, phone number and fax number.

1.04 QUALITY ASSURANCE

A. Hardware supplier shall employ an Architectural Hardware Consultant (AHC) as certified by DHI and a member of the seal program who shall be available at reasonable times during course of work for Project hardware consultation.

B. Door hardware conforming to ICC/ANSI A117.1: Handles, pulls, latches, locks and operating devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.

C. Fire Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in assemblies complying with NFPA 80 that are listed and or labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UL 10C, unless otherwise indicated.

D. Fire Door Inspection: Prior to receiving certificate of occupancy have fire rated doors inspected by an independent certified Fire and Egress Door Assembly Inspector (FDAI), as certified by Intertek (ITS), a written report shall be submitted to Owner and Contractor. Doors failing inspection shall be adjusted, replaced or modified to be within appropriate code requirements.

E. Smoke and Draft Control Door Assemblies: Where smoke and draft control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.

F. Door hardware certified to ANSI/BHMA standards as noted, participate and be listed in BHMA Certified Products Directory.

G. Substitution request: Include the reason for requesting the substitution, clear catalog copy highlighting the proposed product and options, compliance statement, technical data, product warranty and lead time, to show how the proposed can meet or exceed established level of design, function, and quality. Approval of request is at the discretion of the owner, architect, and their designated consultants.

H. Pre-installation Meeting: Comply with requirements in Division 1 Section “Project Meetings”.
   1. Convene meeting seven days before installation. Participants required to attend: Contractor, installer, material supplier, manufacturer representatives. Include in-conference decisions regarding proper installation methods and procedures for receiving and handling hardware.
   2. Review and finalize construction schedule and verify availability of materials, installer’s personnel, equipment and facilities needed to make progress and avoid delays.
I. Within fourteen days of receipt of approved door hardware submittals contact Owner with representative from hardware supplier to establish a keying conference. Verify keyway, visual key identification, number of master keys and keys per lock. Provide keying system per Owner’s instructions.

J. Installer Qualifications: Specialized in performing installation of this Section and have five years minimum documented experience.

K. Hardware listed in 3.07 - Hardware Schedule is intended to establish type and grade.

1.05 DELIVERY, STORAGE AND HANDLING

A. Provide clean, dry and secure room for hardware delivered to Project but not yet installed.

B. Furnish hardware with each unit marked and numbered in accordance with approved finish hardware schedule. Include door and item number for each type of hardware.

C. Pack each item complete with necessary parts and fasteners in manufacturer’s original packaging.

D. Deliver permanent keys and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to Owner shall be established at “Keying Conference.”

E. Waste Management and Disposal: Separate waste materials for reuse or recycling in accordance with Division 1.

1.06 WARRANTY

A. General Warranty: Owner may have under provisions of the Contract Documents and be an addition and run concurrent with other warranties made by Contractor under requirements of the Contract documents.

B. Special Warranty: Warranties specified in this article shall not deprive Owner of other rights.
   1. Lifetime for manual door closers.
   2. Lifetime for mortise, auxiliary and bored locks.
   3. Lifetime for exit devices.

C. Replace or repair defective products during warranty period in accordance with manufacturer’s warranty at no cost to Owner. There is no warranty against defects due to improper installation, abuse and failure to exercise normal maintenance.

D. Maintenance Tool and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner’s continued adjustment, maintenance, removal and replacement of door hardware.
PART 2 – PRODUCTS

2.01 HINGES

A. Hinges of one manufacturer as listed for continuity of design and consideration of warranty.

B. Standards: Products to be certified and listed by the following:

C. Butt Hinges:
   1. Hinge weight and size unless otherwise indicated in hardware sets:
      a. Doors up to 36” wide and up to 1-3/4” thick provide hinges with a minimum thickness of .134” and a minimum of 4-1/2” in height.
      b. Doors from 36” wide up to 42” wide and up to 1-3/4” thick provide hinges with a minimum thickness of .145” and a minimum of 4-1/2” in height.
      c. For doors from 42” wide up to 48” wide and up to 1-3/4” thick provide hinges with a minimum thickness of .180” and a minimum of 5” in height.
      d. Doors greater than 1-3/4” thick provide hinges with a minimum thickness of .180” and a minimum of 5” in height.
      e. Width of hinge is to be minimum required to clear surrounding trim.

   2. Base material unless otherwise indicated in hardware sets:
      a. Exterior Doors: 304 Stainless Steel, Brass or Bronze material.
      b. Interior Doors: Steel material.
      c. Fire Rated Doors: Steel or 304 Stainless Steel materials.
      d. Stainless Steel ball bearing hinges to have stainless steel ball bearings. Steel ball bearings are unacceptable.

   3. Quantity of hinges per door unless otherwise stated in hardware sets:
      a. Doors up to 60” in height provide 2 hinges.
      b. Doors 60” up to 90” in height provide 3 hinges.
      c. Doors 90” up to 120” in height provide 4 hinges.
      d. Doors over 120” in height add 1 additional hinge per each additional 30” in height.
      e. Dutch doors provide 4 hinges.

   4. Hinge design and options unless otherwise indicated in hardware sets:
      a. Hinges are to be of a square corner five-knuckle design, flat button tips and have ball bearings unless otherwise indicated in hardware sets.
      b. Out-swinging exterior and out-swinging access-controlled doors shall have Non-Removable Pins (NRP) to prevent removal of pin while door is in closed position.
      c. When full width of opening is required, use hinges that are designed to swing door completely from opening when door is opened to 95 degrees.
      d. Provide mortar boxes for frames that require any electrically modified hinges if not an integral part of frame.
e. When shims are necessary to correct frame or door irregularities, provide metal shims only.

5. Acceptable Manufacturers:
   - Standards Weight
     - Hager: BB1279/BB1191
     - Bummer: BB5000/BB5002
     - McKinney: TA2714/TA2314

2.02 LOCKS AND LATCHES

A. Locks and latches of one manufacturer as listed for continuity of design and consideration of warranty.

B. Standards: Product to be certified and listed by following:
   1. ANSI/BHMA A156.2 Series 4000 Certified to Grade 1.
   2. ANSI/BHMA A250.13 Certified for a minimum design load of 1150 lbf (100 psf) for single outswinging doors measuring 36” in width and 84” in height and a minimum design load of 1150lbf (70psf) for out-swinging single doors measuring 48” in width and 84” in height.
   3. UL/cUL Labeled and listed for functions up to 3 hours for single doors up to 48” in width and up to 96” in height.
   4. UL10C/UBC 7-2 Positive Pressure Rated.
   5. ICC/ANSI A117.1.

C. Lock and latch function numbers and descriptions of manufacturer’s series as listed in hardware sets.

D. Material and Design:
   1. Lock and Latch chassis to be zinc dichromate for corrosion resistance.
   2. Keyed functions to be of a freewheeling design to help resist against vandalism.
   3. Non-handed, field reversible.
   4. Thru-bolt mounting with no exposed screws.
   5. Levers, zinc cast and plated to match finish designation in hardware sets.
   6. Roses, wrought Brass or Stainless-Steel material.

E. Latch and Strike:
   1. Stainless Steel latch bolt with minimum of 1/2” throw and deadlocking for keyed and exterior functions. Provide 3/4” latchbolt for pairs of fire-rated doors where required by door manufacture. Standard backset to be 2-3/4” and adjustable faceplate to accommodate a square edge door or a standard 1/8” beveled edge door.
   2. Strike is to fit a standard ANSI A115 prep measuring 1-1/4” x 4-7/8” with proper lip length to protect surrounding trim.

F. Acceptable Manufacturers:
   1. Hager: 3500 Series.
2. Schlage: AL Series.

2.03 EXIT DEVICES

A. Exit Devices of one manufacturer as listed for continuity of design and consideration of warranty. Touch pad type, finish to match balance of door hardware.

B. Standards: Manufacturer to be certified and or listed by the following:
   1. BHMA Certified ANSI A156.3 Grade 1.
   2. UL/cUL Listed for up to 3 hours for “A” labeled doors.
   3. UL10C/UBC 7-2 Positive Pressure Rated.
   4. UL10B Neutral Pressure Rated.
   5. UL 30S Listed for Panic Hardware.

C. Material and Design:
   1. Touch pad shall extend a minimum of one half of door width. Freewheeling lever design shall match design of lock levers. Exit device to mount flush with door.
   2. Latchbolts:
      a. Rim device – 3/4” throw, Pullman type with automatic dead-latching, stainless steel
      b. Surface vertical rod device – Top 1/2” throw, Pullman type with automatic dead-latching, stainless steel. Bottom 1/2” throw, Pullman type, held retracted during door swing, stainless steel.
   3. Fasteners: Wood screws, machine screws, and thru-bolts.

D. Lock and Latch Functions: Function numbers and descriptions of manufacturer’s series and lever styles indicated in door hardware sets.

E. Acceptable Manufacturers:
   1. Hager: 4500 Series
   2. Von Duprin: 99 Series
   3. Sargent: 80 Series

2.04 CYLINDERS AND KEYING

A. Cylinders of one manufacturer as listed for continuity of design and consideration of warranty.

B. Standards: Manufacturer shall meet the following:
   1. Auxiliary Locks: ANSI/BHMA A156.5
   2. DHI Handbook “Keying systems and nomenclature” (1989)

C. Cylinders:
   1. Manufacturer’s standard tumbler type, six-pin small format interchangeable core.
   2. Furnish with cams/tailpieces as required for locking device that is being furnished for project.
D. Keying:
   1. Copy of Owners approved keying schedule submitted to Owner and Architect with documentation of which keying conference was held and Owner’s sign-off.
   2. Provide a bitting list to Owner of combinations as established and expand to twenty-five percent for future use or as directed by Owner.
   3. Keys to be shipped to Owner’s representative, individually tag per keying conference.
   4. Provide construction cores with 20 construction keys

E. Acceptable manufacturers:
   1. Hager:
   2. Schlage:
   3. Sargent:

2.05 CLOSERS

A. Closers of one manufacturer as listed for continuity of design and consideration of warranty. Unless otherwise indicated on hardware schedule, comply with manufacturer’s recommendations for size of closer, depending on width of door, frequency of use, atmospheric pressure, ADAAG requirements, and fire rating.

B. Standards: Manufacturer to be certified and or listed by the following:
   1. BHMA Certified ANSI A156.4 Grade 1.
   2. ADA Compliant ANSI A117.1.
   3. UL/cUL Listed up to 3 hours.
   4. UL10C Positive Pressure Rated.
   5. UL10B Neutral Pressure Rated.

C. Material and Design:
   1. Provide cast iron non-handed bodies with full plastic covers.
   2. Closers shall have separate staked adjustable valve screws for latch speed, sweep speed, and backcheck.
   3. Provide Tri-Pack arms and brackets for regular arm, top jamb, and parallel arm mounting.
   4. One-piece seamless steel spring tube sealed in hydraulic fluid.
   5. Double heat-treated steel tempered springs.
   7. Triple heat-treated steel spindle.
   8. Full rack and pinion operation.

D. Mounting:
   1. Out-swing doors use surface parallel arm mount closers except where noted on hardware schedule.
   2. In-swing doors use surface regular arm mount closers except where noted on hardware schedule.
   3. Provide brackets and shoe supports for aluminum doors and frames to mount fifth screw.
   4. Furnish drop plates where top rail conditions on door do not allow for mounting of closer and where backside of closer is exposed through glass.
E. Size closers in compliance with requirements for accessibility (ADAAG). Comply with following maximum opening force requirements.
   1. Interior hinged openings: 5.0 lbs.
   2. Fire-rated and exterior openings use minimum opening force allowable by authority having jurisdiction.

F. Fasteners: Provide self-reaming, self-tapping wood and machine screws, and sex nuts and bolts for each closer.

G. Acceptable manufacturers:
   1. Hager: 5200 Series
   2. LCN: 1450 Series
   3. Sargent: 281 Series

### 2.06 STOPS

A. Stops and holders of one manufacturer as listed for continuity of design and consideration of warranty.

B. Wall Stops: Provide door stops wherever necessary to prevent door or hardware from striking an adjacent partition or obstruction. Provide wall stops when possible. Door stops, and holders mounted in concrete floor or masonry walls have stainless steel machine screws and lead expansion shields.

C. Standards: Manufacturer shall meet requirements for:
   1. Auxiliary Hardware: ANSI/BHMA A156.16.

D. Acceptable Manufacturers:

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Floor</th>
<th>Wall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hager</td>
<td>243F</td>
<td>234W</td>
</tr>
<tr>
<td>Rockwood</td>
<td>442</td>
<td>403</td>
</tr>
<tr>
<td>Burns</td>
<td>520</td>
<td>565</td>
</tr>
</tbody>
</table>

### 2.07 DOOR GASKETING AND WEATHERSTRIP

A. Door gasketing and weatherstrip of one manufacturer as listed for continuity of design and consideration of warranty.

B. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing where indicated on hardware schedule. Provide non-corrosive fasteners for exterior applications.
   1. Perimeter gasketing: Apply to head and jamb, forming seal between door and frame.
2. Meeting stile gasketing: Fasten to meeting stiles, forming seal when doors are in closed position.
3. Door bottoms: Apply to bottom of door, forming seal with threshold or floor when door is in closed position.
4. Sound Gasketing: Cutting or notching for stop mounted hardware not permitted.
5. Drip Guard: Apply to exterior face of frame header. Lip length to extend 4” beyond width of door.

C. Standards: Manufacturer shall meet requirements for:
1. Door Gasketing and Edge Seal Systems: ANSI/BHMA A156.22.
2. BHMA certified for door sweeps, automatic door bottoms, and adhesive applied gasketing.

D. Smoke-Labeled Gasketing: Comply with NFPA 105 listed, labeled, and acceptable to Authorities Having Jurisdiction, for smoke control indicated.
1. Provide smoke-labeled gasketing on 20-minute rated doors and on smoke rated doors.

E. Fire-Rated Gasketing: Comply with NFPA 80 listed, labeled, and acceptable to Authorities Having Jurisdiction, for fire ratings indicated.

F. Refer to Section 08 1416 Wood Doors for Category A or Category B. Comply with UBC 7-2 and UL10C positive pressure where frame applied intumescent seals are required.

G. Acceptable Manufacturers:
1. Perimeter Gasketing: Adhesive Applied
   a. Hager: 726S
   b. K.N. Crowder: W22
   c. Reese:

2. Door Bottom Sweeps:
   a. Hager: 801S
   b. K.N. Crowder: W245
   c. Reese: 967

2.09 SILENCERS

A. Where smoke, light, or weather seal are not required, provide three silencers per single door frame, two per double door frame and four per Dutch door frame.

B. Standards: Manufacturer shall meet requirements for:
1. Auxiliary Hardware: ANSI/BHMA A156.16

C. Acceptable Manufacturers: Hollow Metal Frame
1. Hager: 307D

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DOOR HARDWARE
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2.14  KEY CABINET

A. Provide key cabinet, surface mounted to wall.

B. Key control system:
   1. Include two sets of key tags, hooks, labels, and envelopes.
   2. Contain system in metal cabinet with baked enamel finish.
   3. Capacity shall be able to hold actual quantities of keys, plus 50 percent.
   4. Provide tools, instruction sheets and accessories required to complete installation.

C. Acceptable Manufacturers:
   1. Lund Equipment
   2. Telkee Incorporated
   3. Key Control

2.15  FINISHES

A. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if within range of approved samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within range of approved samples.

B. Comply with base material and finish requirements indicated by ANSI/BHMA A156.18 designations in hardware schedule.

PART 3 – EXECUTION

3.01  EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

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

3.02  INSTALLATION

A. Install hardware per manufacturer’s instructions and in compliance with:
   1. NFPA 80
2. NFPA 105
3. ICC/ANSI A117.1
4. ANSI/BHMA A156.115 Hardware Preparation in Steel Doors and Steel Frames
5. ANSI/BHMA A156.115W Hardware Preparation in Wood Doors with Wood or Steel Frames
6. DHI Publication – Installation Guide for Doors and Hardware
7. UL10C/UBC 7-2
8. Local building code.
9. Approved shop drawings.
10. Approved finish hardware schedule.

B. Do not install surface mounted items until finishes have been completed on substrates involved. Set unit level, plumb and true to line location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

3.03 FIELD QUALITY CONTROL

A. Material supplier to schedule final walk through to inspect hardware installation ten (10) business days before final acceptance of Owner. Material supplier shall provide a written report detailing discrepancies of each opening to General Contractor within seven (7) calendar days of walk through.

3.04 ADJUSTMENT, CLEANING AND DEMONSTRATING

A. Adjustment: Adjust and check each opening to ensure proper operation of each item of finish hardware. Replace items that cannot be adjusted to operate freely and smoothly or as intended for application at no cost to Owner.

B. Cleaning: Clean adjacent surfaces soiled by hardware installation. Clean finish hardware per manufacturer’s instructions after final adjustments has been made. Replace items that cannot be cleaned to manufacturer’s level of finish quality at no cost to Owner.

C. Demonstration: Conduct a training class for building maintenance personnel demonstrating the adjustment, operation of mechanical and electrical hardware. Special tools for finish hardware to be turned over and explained usage at this meeting.

3.05 PROTECTION

A. Leave manufacturer’s protective film intact and provide proper protection for all other finish hardware items that do not have protective material from the manufacture until Owner accepts project as complete.

3.06 HARDWARE SET SCHEDULE

A. Guide: Door hardware items have been placed in sets which are intended to be a guide of design, grade, quality, function, operation, performance, exposure, and like characteristics of
door hardware, and may not be complete. Provide door hardware required to make each set complete and operational.

B. Hardware schedule does not reflect handing, backset, method of fastening, and like characteristics of door hardware and door operation.

C. Review door hardware sets with door types, frames, sizes and details on drawings. Verify suitability and adaptability of items specified in relation to details and surrounding conditions.

**HARDWARE SCHEDULE**

**HW Set 1**

<table>
<thead>
<tr>
<th>Door #</th>
<th>Type</th>
<th>Dimensions</th>
<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door #104</td>
<td>Unassigned</td>
<td>3-0 x 7-0 x 1-3/4”</td>
<td>HM x HM</td>
</tr>
<tr>
<td>Door #107</td>
<td>Office</td>
<td>3-0 x 7-0 x 1-3/4”</td>
<td>HM x HM</td>
</tr>
<tr>
<td>Door #112</td>
<td>Break</td>
<td>3-0 x 7-0 x 1-3/4”</td>
<td>HM x HM</td>
</tr>
<tr>
<td>Door #120</td>
<td>Computer</td>
<td>3-0 x 7-0 x 1-3/4”</td>
<td>WD x HM</td>
</tr>
<tr>
<td>Door #120.1</td>
<td>Computer</td>
<td>3-0 x 7-0 x 1-3/4”</td>
<td>HM x HM</td>
</tr>
<tr>
<td>Door #128</td>
<td>Office</td>
<td>3-0 x 7-0 x 1-3/4”</td>
<td>WD x HM</td>
</tr>
<tr>
<td>Door #131</td>
<td>Office</td>
<td>3-0 x 7-0 x 1-3/4”</td>
<td>WD x HM</td>
</tr>
</tbody>
</table>

Each opening to have:

3 Hinges BB1279 4.5” x 4.5” US26D HA
1 Classroom Lockset 3570 2-3/4” WTN ASA IC US26D HA
1 Core 3981 US26D HA
1 Door Closer 5200 MLT 1-6 ALM HA
1 Kickplate 190S 8” x 2” LDW US32D HA
1 Door Stop 243F/234W As required US26D HA
3 Silencers 307D Gray HA

**HW Set 2**

<table>
<thead>
<tr>
<th>Door #</th>
<th>Type</th>
<th>Dimensions</th>
<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door #111</td>
<td>Conference</td>
<td>3-0 x 7-0 x 1-3/4”</td>
<td>WD x HM</td>
</tr>
<tr>
<td>Door #111.1</td>
<td>Conference</td>
<td>3-0 x 7-0 x 1-3/4”</td>
<td>WD x HM</td>
</tr>
<tr>
<td>Door #121</td>
<td>Conference</td>
<td>3-0 x 7-0 x 1-3/4”</td>
<td>WD x HM</td>
</tr>
<tr>
<td>Door #121.1</td>
<td>Conference</td>
<td>3-0 x 7-0 x 1-3/4”</td>
<td>WD x HM</td>
</tr>
</tbody>
</table>

Each opening to have:

3 Hinges BB1279 4.5” x 4.5” US26D HA
1 Passage Lockset 3510 2-3/4” WTN ASA IC US26D HA
1 Kickplate 190S 8” x 2” LDW US32D HA
1 Door Stop  243F/234W As required  US26D  HA
3 Silencers  307D  Gray  HA

**HW Set 3**

<table>
<thead>
<tr>
<th>Door #</th>
<th>Type</th>
<th>Measurements</th>
<th>Finish</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>108</td>
<td>Storage</td>
<td>3-0 x 7-0 x 1-3/4&quot;</td>
<td>WD x HM</td>
<td></td>
</tr>
<tr>
<td>109</td>
<td>Data/ Tel</td>
<td>3-0 x 7-0 x 1-3/4&quot;</td>
<td>WD x HM</td>
<td></td>
</tr>
<tr>
<td>116</td>
<td>Janitor</td>
<td>3-0 x 7-0 x 1-3/4&quot;</td>
<td>HM x HM</td>
<td></td>
</tr>
<tr>
<td>125</td>
<td>Storage</td>
<td>3-0 x 7-0 x 1-3/4&quot;</td>
<td>WD x HM</td>
<td></td>
</tr>
</tbody>
</table>

Each opening to have:

<table>
<thead>
<tr>
<th>Qty</th>
<th>Item</th>
<th>Measurements</th>
<th>Finish</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Hinges</td>
<td>BB1279  4.5&quot; x 4.5&quot;</td>
<td>US26D</td>
<td>HA</td>
</tr>
<tr>
<td>1</td>
<td>Storeroom Lockset</td>
<td>3580 2-3/4&quot; WTN ASA IC</td>
<td>US26D</td>
<td>HA</td>
</tr>
<tr>
<td>1</td>
<td>Core</td>
<td>3981</td>
<td>US26D</td>
<td>HA</td>
</tr>
<tr>
<td>1</td>
<td>Kickplate</td>
<td>1905  8&quot; x 2&quot; LDW</td>
<td>US32D</td>
<td>HA</td>
</tr>
<tr>
<td>1</td>
<td>Door Stop</td>
<td>243F/234W As required</td>
<td>US26D</td>
<td>HA</td>
</tr>
<tr>
<td>3</td>
<td>Silencers</td>
<td>307D</td>
<td>Gray</td>
<td>HA</td>
</tr>
</tbody>
</table>

**HW Set 4**

<table>
<thead>
<tr>
<th>Door #</th>
<th>Type</th>
<th>Measurements</th>
<th>Finish</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>105</td>
<td>Office</td>
<td>3-0 x 7-0 x 1-3/4&quot;</td>
<td>WD x HM</td>
<td></td>
</tr>
<tr>
<td>106</td>
<td>Office</td>
<td>3-0 x 7-0 x 1-3/4&quot;</td>
<td>WD x HM</td>
<td></td>
</tr>
<tr>
<td>113</td>
<td>Office</td>
<td>3-0 x 7-0 x 1-3/4&quot;</td>
<td>WD x HM</td>
<td></td>
</tr>
<tr>
<td>114</td>
<td>Office</td>
<td>3-0 x 7-0 x 1-3/4&quot;</td>
<td>WD x HM</td>
<td></td>
</tr>
<tr>
<td>122</td>
<td>Office</td>
<td>3-0 x 7-0 x 1-3/4&quot;</td>
<td>WD x HM</td>
<td></td>
</tr>
</tbody>
</table>

Each opening to have:

<table>
<thead>
<tr>
<th>Qty</th>
<th>Item</th>
<th>Measurements</th>
<th>Finish</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Hinges</td>
<td>BB1279  4.5&quot; x 4.5&quot;</td>
<td>US26D</td>
<td>HA</td>
</tr>
<tr>
<td>1</td>
<td>Office Lockset</td>
<td>3550 2-3/4&quot; WTN ASA IC</td>
<td>US26D</td>
<td>HA</td>
</tr>
<tr>
<td>1</td>
<td>Core</td>
<td>3981</td>
<td>US26D</td>
<td>HA</td>
</tr>
<tr>
<td>1</td>
<td>Kickplate</td>
<td>1905  8&quot; x 2&quot; LDW</td>
<td>US32D</td>
<td>HA</td>
</tr>
<tr>
<td>1</td>
<td>Door Stop</td>
<td>243F/234W As required</td>
<td>US26D</td>
<td>HA</td>
</tr>
<tr>
<td>3</td>
<td>Silencers</td>
<td>307D</td>
<td>Gray</td>
<td>HA</td>
</tr>
</tbody>
</table>
### HW Set 5

<table>
<thead>
<tr>
<th>Door #</th>
<th>Description</th>
<th>Dimensions</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>123</td>
<td>Toilet</td>
<td>3-0 x 7-0 x 1-3/4&quot;</td>
<td>WD x HM</td>
</tr>
</tbody>
</table>

Each opening to have:

- **3** Hinges: BB1279 4.5" x 4.5" US26D HA
- **1** Interconnected Lock: 3796 x Occupancy Indicator US26D HA
- **1** Kickplate: 190S 8" x 2" LDW US32D HA
- **1** Door Stop: 243F/234W As required US26D HA
- **3** Silencers: 307D Gray HA

### HW Set 6

<table>
<thead>
<tr>
<th>Door #</th>
<th>Description</th>
<th>Dimensions</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>117</td>
<td>Men’s</td>
<td>3-0 x 7-0 x 1-3/4&quot;</td>
<td>WD x HM</td>
</tr>
<tr>
<td>118</td>
<td>Women’s</td>
<td>3-0 x 7-0 x 1-3/4&quot;</td>
<td>WD x HM</td>
</tr>
</tbody>
</table>

Each opening to have:

- **3** Hinges: BB1279 4.5" x 4.5" US26D HA
- **1** Push Plate: 30S 4" x 16" US32D HA
- **1** Pull Plate: 33E 4" x 16" US32D HA
- **1** Door Closer: 5200 MLT 1-6 ALM HA
- **1** Kickplate: 190S 8” x 2” LDW US32D HA
- **1** Mopplate: 190S 4” x 2” LDW US32D HA
- **1** Door Stop: 243F/234W As required US26D HA
- **3** Silencers: 307D Gray HA

### HW Set 7

<table>
<thead>
<tr>
<th>Door #</th>
<th>Description</th>
<th>Dimensions</th>
<th>Fire Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>014</td>
<td>Stair- Basement</td>
<td>3-0 x 7-0 x 1-3/4&quot;</td>
<td>UL 60 min</td>
</tr>
<tr>
<td>102</td>
<td>Corridor 102</td>
<td>3-0 x 7-0 x 1-3/4&quot;</td>
<td>UL 60 min</td>
</tr>
<tr>
<td>102.1</td>
<td>Stair 103- Corridor 102</td>
<td>3-6 x 7-0 x 1-3/4&quot;</td>
<td>UL 60 min</td>
</tr>
<tr>
<td>103</td>
<td>Stair 103- NIC</td>
<td>M.E. x 7-0 x 1-3/4&quot;</td>
<td>UL 60 min</td>
</tr>
<tr>
<td>100.2</td>
<td>Stair-First Floor</td>
<td>3-0 x 7-0 x 1-3/4&quot;</td>
<td>UL 60 min</td>
</tr>
<tr>
<td>129</td>
<td>Vestibule 129</td>
<td>3-0 x 7-0 x 1-3/4&quot;</td>
<td>UL 60 min</td>
</tr>
<tr>
<td>203</td>
<td>Stair 203-Corridor 202</td>
<td>3-6 x 7-0 x 1-3/4&quot;</td>
<td>UL 60 min</td>
</tr>
<tr>
<td>203.1</td>
<td>Stair 203-NIC</td>
<td>M.E. x 7-0 x 1-3/4&quot;</td>
<td>UL 60 min</td>
</tr>
<tr>
<td>230.1</td>
<td>Stair 230</td>
<td>3-0 x 7-0 x 1-3/4&quot;</td>
<td>UL 60 min</td>
</tr>
<tr>
<td>230.2</td>
<td>Stair 230</td>
<td>3-0 x 7-0 x 1-3/4&quot;</td>
<td>UL 60 min</td>
</tr>
</tbody>
</table>

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DOOR HARDWARE
Page 15 of 17
Each opening to have:

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Model/Specifications</th>
<th>Finish</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Hinges</td>
<td>BB1279 4.5” x 4.5”</td>
<td>US26D</td>
<td>HA</td>
</tr>
<tr>
<td>1</td>
<td>Exit device</td>
<td>4501F Rim x 45CE WTN</td>
<td>US26D</td>
<td>HA</td>
</tr>
<tr>
<td>1</td>
<td>Cylinder</td>
<td>3902 1-1/4” IC</td>
<td>US26D</td>
<td>HA</td>
</tr>
<tr>
<td>1</td>
<td>Core</td>
<td>3981</td>
<td>US26D</td>
<td>HA</td>
</tr>
<tr>
<td>1</td>
<td>Door Closer</td>
<td>5200 MLT 1-6 x 5957 arm</td>
<td>ALM</td>
<td>HA</td>
</tr>
<tr>
<td>1</td>
<td>Kickplate</td>
<td>190S 8” x 2” LDW</td>
<td>US32D</td>
<td>HA</td>
</tr>
<tr>
<td>1</td>
<td>Door Stop</td>
<td>243F/234W As required</td>
<td>US26D</td>
<td>HA</td>
</tr>
<tr>
<td>1</td>
<td>Smoke Seal</td>
<td>726S</td>
<td>CHARCOAL</td>
<td>HA</td>
</tr>
<tr>
<td>1</td>
<td>Door Bottom Sweep</td>
<td>801S Brush</td>
<td>MIL</td>
<td>HA</td>
</tr>
</tbody>
</table>

Door #102 only:

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Model/Specifications</th>
<th>Finish</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Magnetic Door Holder</td>
<td>380S x [voltage]</td>
<td>LS</td>
<td>HA</td>
</tr>
</tbody>
</table>

HW Set 8

(Uneven double door: Verify in field width of narrow (inactive) leaf with actual door opening)

Door #003  Stair 3-0 x 7-0 x 1-3/4”/ 2-0 x 7-0 x 1 ¾”  UL 60 min  HM x HM
Door #014.1 Stair 3-0 x 7-0 x 1-3/4”/ 2-0 x 7-0 x 1 ¾”  UL 60 min  HM x HM
Door #100.1 Stair 3-0 x 7-0 x 1-3/4”/ 2-0 x 7-0 x 1 ¾”  UL 60 min  HM x HM
Door #230  Stair 3-0 x 7-0 x 1-3/4”/ 2-0 x 7-0 x 1 ¾”  UL 60 min  HM x HM

Each opening to have:

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
<th>Model/Specifications</th>
<th>Finish</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Hinges</td>
<td>BB1279 4.5” x 4.5”</td>
<td>US26D</td>
<td>HA</td>
</tr>
<tr>
<td>1</td>
<td>Exit device (active leaf)</td>
<td>4501MRT x 45MC WTN</td>
<td>US26D</td>
<td>HA</td>
</tr>
<tr>
<td>1</td>
<td>Cylinder</td>
<td>3902 1-1/4” IC</td>
<td>US26D</td>
<td>HA</td>
</tr>
<tr>
<td>1</td>
<td>Core</td>
<td>3981</td>
<td>US26D</td>
<td>HA</td>
</tr>
<tr>
<td>2</td>
<td>Door Closer</td>
<td>5200 MLT 1-6 x 5957 arm</td>
<td>ALM</td>
<td>HA</td>
</tr>
<tr>
<td>2</td>
<td>Magnetic Door Holder</td>
<td>380S x [voltage]</td>
<td>LS</td>
<td>HA</td>
</tr>
<tr>
<td>2</td>
<td>Auto Flush Bolts</td>
<td>292D</td>
<td>US32D</td>
<td>HA</td>
</tr>
<tr>
<td>1</td>
<td>Coordinator</td>
<td>297D 52”</td>
<td>USP</td>
<td>HA</td>
</tr>
<tr>
<td>1</td>
<td>Filler Plate</td>
<td>297F</td>
<td>USP</td>
<td>HA</td>
</tr>
<tr>
<td>2</td>
<td>Kickplate</td>
<td>190S 8” x 2” LDW</td>
<td>US32D</td>
<td>HA</td>
</tr>
<tr>
<td>2</td>
<td>Door Stop</td>
<td>243F/234W As required</td>
<td>US26D</td>
<td>HA</td>
</tr>
<tr>
<td>1</td>
<td>Smoke Seal</td>
<td>726S</td>
<td>CHARCOAL</td>
<td>HA</td>
</tr>
<tr>
<td>2</td>
<td>Door Bottom Sweep</td>
<td>801S Brush</td>
<td>MIL</td>
<td>HA</td>
</tr>
</tbody>
</table>

HW Set 9

Door #101  Electrical 132  3-0 x 7-0 x 1-3/4”  HM x HM
Door #129  Vestibule  3-0 x 7-0 x 1-3/4”  WD x HM

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DOOR HARDWARE
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Each opening to have:

<table>
<thead>
<tr>
<th>Item</th>
<th>Model/Size</th>
<th>Finish</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hinges</td>
<td>BB1279 4.5” x 4.5”</td>
<td>US26D</td>
<td>HA</td>
</tr>
<tr>
<td>Exit device</td>
<td>4501 Rim x 45CE WTN</td>
<td>US26D</td>
<td>HA</td>
</tr>
<tr>
<td>Cylinder</td>
<td>3902 1-1/4” IC</td>
<td>US26D</td>
<td>HA</td>
</tr>
<tr>
<td>Core</td>
<td>3981</td>
<td>US26D</td>
<td>HA</td>
</tr>
<tr>
<td>Door Closer</td>
<td>5200 MLT 1-6 x 5957 arm</td>
<td>ALM</td>
<td>HA</td>
</tr>
<tr>
<td>Kickplate</td>
<td>190S 8” x 2” LDW</td>
<td>US32D</td>
<td>HA</td>
</tr>
<tr>
<td>Smoke Seal</td>
<td>726S</td>
<td>Charcoal</td>
<td>HA</td>
</tr>
<tr>
<td>Door Bottom Sweep</td>
<td>801S Brush (Door #130 only)</td>
<td>MIL</td>
<td>HA</td>
</tr>
</tbody>
</table>

**HW Set 10**

Door #100 Exterior 2/3-0 x 7-0 x 1-3/4” AL x AL

Each opening to have:

<table>
<thead>
<tr>
<th>Item</th>
<th>Model/Size</th>
<th>Finish</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous hinges</td>
<td>780-112HD</td>
<td>DBA</td>
<td>RO</td>
</tr>
<tr>
<td>Door Closers</td>
<td>5100 MLT 1-6</td>
<td>DBZ</td>
<td>HA</td>
</tr>
</tbody>
</table>

All other hardware by Aluminum Door Supplier

**HW Set 11**

1 Key Cabinet #1200 Wall mount Lund
30 key capacity expandable to 90

END OF SECTION
PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
   1. Fixed Louvers

B. Related Work: The following items are not included in this Section and are specified under the designated Sections:
   1. Section 07 92 00 - JOINT SEALANTS for sealants installed in perimeter joints between louver frames and adjoining construction.

1.3 DEFINITIONS

A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.

B. Wind-driven Rain Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide louvers capable of withstanding the effects of gravity loads and wind loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act on vertical projection of louvers. Loads as required by Code.
B. Seismic Performance: Provide louvers capable of withstanding the effects of earthquake motions as required by code.

C. Thermal Movements: Provide louvers that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): 120°F ambient; 180°F material surfaces.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other Work. Show blade profiles, angles, and spacing.
   1. For installed louvers indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Samples for Verification: For each type of metal finish required.

D. Qualification Data: For professional engineer.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain louvers and vents through one source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

B. Welding: Qualify procedures and personnel according to the following:


1.7 PROJECT CONDITIONS
A. Field Measurements: Verify louver openings by field measurements before fabrication and indicate measurements on Shop Drawings.
   1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating louvers without field measurements. Coordinate construction to ensure that actual opening dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Fixed Louvers:
      a. Greenheck
      b. Airolite
      c. Ruskin

2.2 PRODUCTS

A. Basis of Design:
   1. Manufacturer: Greenheck
   2. Product: EHH-401 Wind Driven Rain Louver Horizontal Blade
   3. Description: EHH-401 is a Wind-Driven Rain louver designed to protect air intake and exhaust openings in building exterior walls that are sensitive to direct water penetration. Design incorporates a drainable head member and horizontal rain resistant blades to provide maximum resistance to wind driven rain in even the most extreme weather conditions.
   1. Standard Construction:
      a. Frame: Heavy gauge extruded 6063-T5 aluminum, 4 in. x 0.081 in. nominal wall thickness;
      b. Blades: Horizontal rain resistant style, heavy gauge extruded 6063-T5 aluminum, 0.063 in. nominal wall thickness, positioned on approximately 2 in. blade spacing;
      c. Construction: Mechanically fastened
      d. Finish: Black Anodized
      e. Size: 64" X 30" (verify in field)
      f. Free Area: 42% of louver size
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

A. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.

B. Set louver on full sill pan flashing with upturned vertical lags on 3 sides of not less than 1 inch. Sill pan to slope to exterior to thoroughly drain.

B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screw where required to protect metal surfaces and to make a weathertight connection.

C. Form closely fitted joints with exposed connections accurately located and secured.

D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

E. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.

F. Protect galvanized and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.

G. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weather tight louver joints are required. Comply
with Section 07 92 00 – JOINT SEALANTS for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

A. Clean exposed surfaces of louvers and vents that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.

B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.

C. Restore louvers and vents damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

END OF SECTION
PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work
of this Section, including but not limited to the following:
1. New interior gypsum wallboard
2. Tile backing panels.
4. Installation of access panels.
5. Marking and identification for fire- and smoke-partitions.
6. Fiberglass acoustical insulation

B. Related Work: The following items are not included in this Section and are specified
under the designated Sections:
1. Section 02 41 13 SELECTIVE DEMOLITION for removal of existing gypsum wall
board to accommodate project intent.
2. Section 08 31 10 - ACCESS DOORS AND FRAMES for installation in gypsum board
assemblies.
3. Section 07 84 10 - PENETRATION FIRESTOPPING for firestopping at penetrations
through gypsum assemblies.
4. Section 07 92 00 - JOINT SEALANTS for finishing joints and acoustical assemblies
where acoustical assemblies are indicated.
5. Section 09 90 00 - PAINTING AND COATING for painting gypsum board
assemblies.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide fire stop tracks capable of withstanding deflection
within limits and under conditions indicated.
1. Design framing system to maintain clearances at openings, to allow for
construction tolerances, and to accommodate live load deflection of primary
building structure.
B. Marking and Identification for Fire- and Smoke-Partitions: Fire walls, fire barriers, fire partitions, smoke barriers, smoke partitions and other walls required to have protected openings or penetrations shall be effectively and permanently identified with signs or stenciling. Such identification shall:
   1. Be located in accessible concealed floor, floor-ceiling or attic spaces; and
   2. Be repeated at intervals not exceeding 30 feet measured horizontally along the wall or partition; and
   3. Include lettering not less than 0.5 inch in height, incorporating the suggested wording: "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," or other wording acceptable to the Architect and the authorities having jurisdiction.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: Full-size Sample in 12-inch-long length for each trim accessory indicated.

C. Shop Drawings: If materials and systems other than those specified and those indicated on the Drawings are proposed for use, submit shop drawings signed and sealed by a structural engineer licensed in the jurisdiction of the project certifying proposed systems meet code requirements, project requirements and the following deflection criteria:
   1. For gypsum board assemblies without applied rigid finishes: L/240
   2. For gypsum board assemblies with applied rigid finishes such as tile, wood paneling: L/360.
   3. Lateral load 5 ps.f. except at shafts.
   4. Lateral load at shafts shall be required based on analysis of equipment and systems using shaft.

1.5 QUALITY ASSURANCE

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

C. Drywall Recycling: All new paper-faced gypsum wallboard scrap (cuts from construction but not demolition waste) shall be recycled by Gypsum Recycling America LLC or approved equal.

D. Comply with ASTM C-645-11a.
   1. Members shall have a protective coating conforming to Specification A 653/A653M, G-40 minimum.
2. No equivalent coatings allowed.
3. G40e is not acceptable.

1.6 STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes.

B. Stack panels flat to prevent sagging.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install interior products until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 NON-LOAD-BEARING STEEL FRAMING, GENERAL

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
   1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
   2. Protective Coating: Manufacturer's standard corrosion-resistant zinc coating, unless otherwise indicated.

2.2 STEEL FRAMING FOR FRAMED ASSEMBLIES

A. Steel Studs and Runners: ASTM C 645.
   1. Minimum Base-Metal Thickness: 0.0312 inch.

B. Slip-Type Head Joints: Where indicated, provide one of the following:
   1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch-deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
   2. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch-deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
   a. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
      i. Steel Network Inc. (The); VertiClip Series.
      ii. Superior Metal Trim; Superior Flex Track System (SFT).

4. Fire Stop Deflection Track: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
   a. Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness compatible with studs and in width to accommodate depth of studs.
   b. Meet or exceed the cyclical, fire, and hose stream tests required in ASTM E-119, ASTM E-814, ASTM 1966, and UL2079
   c. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
      i. Clark Dietrich; Slp-TRK, Max Trak, Balze Frame DSL.
      ii. CEMCO; Fire Stick, Slotted Track, M-Track/CMT
      iii. Grace Construction Products; FlameSafe FlowTrak System.
      iv. Fire Trak Corp.; Fire Trak attached to studs with Fire Trak Slip Clip.
      v. Metal-Lite, Inc.; The System.

C. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width required.
   1. Minimum Base-Metal Thickness: 0.0312 inch.

D. Cold-Rolled Channel Bridging: 0.0538-inch bare-steel thickness, with minimum 1/2-inch-wide flanges.
   1. Depth: 1-1/2 inches.
   2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch-thick, galvanized steel.

E. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

F. Isolation Strip at Exterior Walls: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.
2.3  INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. USG Corporation.
2. Georgia-Pacific (G-P) Gypsum LLC.

B. Water Resistant Fiberglass-Mat Faced Gypsum Board.
1. Thickness: 5/8 inch
2. Ceilings and Walls of Locker Room and Toilet Rooms
3. Paperless Interior Panel" panels, which have coated glass-mat facings front and back, and comply with both ASTM C 36/C 36M and ASTM C 1177/C 1177M.

2.4  TILE BACKING PANELS

A. Fiberglass-Mat Faced Gypsum Tile Backing Board: ASTM C1178:
1. Thickness: 5/8 inch.
2. Width: 4 feet.
3. Length: 8 feet.
4. Weight: 2.5 lb/sq. ft.
5. Edges: Square.
6. Surfacing: Coated fiberglass mat on face, back, and long edges.
9. Permeance (ASTM E96): Not more than 1.0 perms when tiled.
11. Acceptable Products:
   a. 5/8 inch DensShield Fireguard Tile Backer, Georgia-Pacific Gypsum. Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or 1325, with manufacturer’s standard edges.

B. Screws:
1. ASTM C1002, with corrosion resistant treatment.

2.5  Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M, with fiberglass mat laminated to both sides and with manufacturer’s standard edges.

A. Basis-of-Design Product: Subject to compliance with requirements, provide Georgia-Pacific Gypsum; “DensGlass Sheathing” or a comparable product by one of the following:
1. CertainTeed Corp.
3. USG Corporation.
4. Core: [As indicated] or required.
5. Long Edges: Square.
TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.
   1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
   2. Shapes:
      a. Cornerbead.
      b. Bullnose bead.
      c. LC-Bead: J-shaped; exposed long flange receives joint compound.
      d. Expansion (control) joint.
      e. Curved-Edge Cornerbead: With notched or flexible flanges.

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Fry Reglet Corp.
      b. Gordon, Inc.
      c. Pittcon Industries.
   2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221, Alloy 6063-T5.
   3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

2.6 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:
   1. Interior Gypsum Wallboard: Paper.
   2. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
   1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
   2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
   3. Fill Coat: For second coat, use setting-type, sandable topping compound.
   4. Finish Coat: For third coat, use setting-type, sandable topping compound.
   5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

2.7 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer’s written recommendations.
B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
   1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
   1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
   2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

E. Acoustic Insulation: Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
   1. Between and around all other office, toilet, mechanical spaces, corridors. 3 1/2" unfaced fiberglass Sound Attenuation Batts.

F. Acoustical Sealant: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   1. Use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   2. Acoustical Sealant for Exposed and Concealed Joints:
      a. Pecora Corp.; AC-20 FTR Acoustical and Insulation Sealant.
      b. USG Corporation.; SHEETROCK Acoustical Sealant.
   3. Acoustical Sealant for Concealed Joints:
      a. Ohio Sealants, Inc.; Pro-Series SC-170 Rubber Base Sound Sealant
      b. Pecora Corp.; BA-98.

2.8 IDENTIFICATION LABELS FOR FIRE- AND SMOKE-PARTITIONS

A. Identification Labels: Vinyl adhesive signs, to comply with applicable local Code.
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Fire Wall Signs, Inc.
      b. Safety Supply Warehouse.
   2. Text: "FIRE AND SMOKE BARRIER - PROTECT ALL OPENINGS"

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.
B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

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

3.2 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754. Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.3 INSTALLING FRAMED ASSEMBLIES

A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

B. Install studs so flanges within framing system point in same direction.

C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install joints at tops of framing systems that prevent axial loading of finished assemblies.

2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on doorframes; install runner track section (for cripple studs) at head and secure to jamb studs.

   a. Install two studs at each jamb, unless otherwise indicated.

   b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.

   c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
   a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

D. Direct Furring: Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

3.4 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
   1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
   2. Fit gypsum panels around ducts, pipes, and conduits.
   3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

3.5 APPLYING INTERIOR GYPSUM BOARD

A. Single-Layer Application:
1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
2. On partitions/walls, apply gypsum panels to minimize end joints.
3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

B. Multilayer Application:
1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints 1 framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

C. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer’s written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.6 APPLYING TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A108.1, at locations indicated to receive tile, with joints treated to comply with ANSI A108.11.

B. Water-Resistant Backing Board: Install at areas not subject to wetting and elsewhere as indicated with 1/4-inch gap where panels abut other construction or penetrations.

C. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.
3.7 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:
   1. Cornerbead: Use at outside corners, unless otherwise indicated.
   2. LC-Bead: Use at exposed panel edges.
   3. Curved-Edge Cornerbead: Use at curved openings.

D. Aluminum Trim: Install in locations indicated on Drawings.

3.8 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below:
   1. Level 1: Ceiling plenum areas and concealed areas not exposed to view.
   2. Level 2: Panels that are substrate for tile.
   3. Level 4: Panel surfaces that will be exposed to view (typical panels).
   4. Level 5: Where indicated on Drawings.

3.9 INSTALLING IDENTIFICATION FOR FIRE- AND SMOKE-PARTITIONS

A. Marking and Identification for Fire- and Smoke-Partitions: Permanently install as required by Code.

3.10 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
B. Remove and replace panels that are wet, moisture damaged, or exhibit mold growth. Repair of damaged panels in place is not acceptable.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION
PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.1.1 Filed Sub-bids

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

B. Sub-bidders must be 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.

C. The Work of this section is shown on Drawings AD2.1 and A2.1.

D. Sub-Sub Trades
   1. Sub bid trades are not required.

1.2 DESCRIPTION OF WORK

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

1. Floor tile.
2. Wall tile.
3. Stone thresholds installed as part of tile installations.
5. Elastomeric sealants for expansion, contraction, control, and isolation joints in tile surfaces.
7. Cleaning existing quarry tile and grout to remain at Vestibule 131.
B. Related Work: The following items are not included in this Section and are specified under the designated Sections:
1. Section 07 92 00 - JOINT SEALANTS for sealing of joints between dissimilar materials.
2. Section 08 31 10 - ACCESS DOORS AND FRAMES for installation in tile.
3. Section 09 21 10 - GYPSUM BOARD ASSEMBLIES for cementitious backer units.
4. Division 22 00 00 - PLUMBING for floor drains

1.3 PERFORMANCE REQUIREMENTS

A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:
1. Level Surfaces: Minimum 0.6.
2. Step Treads: Minimum 0.6.
3. Ramp Surfaces: Minimum 0.8.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

C. Samples for Verification:
1. Assembled samples with grouted joints for each type and composition of tile and for each color and finish required, at least 12 inches square and mounted on rigid panel. Use grout of type and in color or colors approved for completed work.
2. Full-size units of each type of trim and accessory for each color and finish required. 3. Stone thresholds in 6-inch lengths.
4. Metal edge strips in 6-inch lengths.

E. Qualification Data: For Installer.

F. Material Test Reports: For each tile-setting and -grouting product.

1.5 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain all tile of same type and color or finish from one source or producer.
1. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section through one source from a single manufacturer for each product:
   1. Stone thresholds.
   2. Waterproofing and Crack Suppression membrane.
   4. Metal edge strips.

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and label intact until time of use. Comply with requirement in ANSI A137.1 for labeling sealed tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

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

D. Store liquid additives in unopened containers and protected from freezing.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 – PRODUCTS

2.1 PRODUCTS, GENERAL
A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.
   1. Provide tile complying with Standard grade requirements, unless otherwise indicated.
   2. For facial dimensions of tile, comply with requirements relating to tile sizes specified in Part 1 "Definitions" Article.
   3. Tile Types: Provide tiles as indicated on the Finish Schedule.


C. Factory Blending: For tile exhibiting color variations within ranges selected during Sample submittals, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer, unless otherwise indicated.

E. Tile Trim Units: Matching characteristics of adjoining flat tile and coordinated with sizes and coursing of adjoining flat tile where applicable. Provide shapes selected from manufacturer's standard shapes.

F. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; extruded aluminum exposed-edge material, with clear anodized satin finish.

G. Stone Thresholds: Uniform, fine- to medium-grained white marble with gray veining, ASTM C 503 with a minimum abrasion resistance of 10 per ASTM C 1353 or ASTM C 241 and with honed finish. Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
   1. Bevel edges at 1:2 slope, aligning lower edge of bevel with adjacent floor finish. Limit height of bevel to 1/2 inch or less, and finish bevel to match face of threshold.

H. Fluid-Applied Waterproofing and Crack Suppression Membrane:
   1. Basis of Design: Laticrete #9255 Hydro Ban
      a. Allow for flood testing in 2 hours at 70°F (21°C) or higher
      b. Does not require the use of fabric.**
      c. Bonds directly to metal and PVC plumbing fixtures only.
      d. Thin; only 0.020–0.030" (0.5–0.8 mm) thick when cured.
      e. Changes in color from a light sage to an olive green when cured.
f. Anti-fracture protection of up to 1/8” (3 mm) over shrinkage and other non-structural cracks.
   i. If wider or more active floor joints are anticipated, consult architect prior to proceeding.

g. "Extra Heavy Service" rating per TCNA performance levels (RE: ASTM C627 Robinson Floor Test).

h. Exceeds ANSI A118.10 and A118.12.
   i. IAPMO approved.
   j. Contains Microban® antimicrobial product protection.

2. Perform 24 hour flood test after Hydro ban installation prior to setting any tile.
   a. Flood test to fill tile area to top of floor drain minimum.

I. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
      a. Laticrete International, Inc.
   2. Cleavage Membrane: Polyethylene sheeting, ASTM D 4397, 4.0 mils thick.

   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
      a. Laticrete International, Inc.
   2. Provide prepackaged, dry-mortar mix containing dry, re-dispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
   3. For wall applications, provide mortar that complies with requirements for non-sagging mortar in addition to the other requirements in ANSI A118.4.

L. Polymer-Modified Tile Grout: ANSI A118.7.
   1. Polymer Type: Acrylic resin or styrene-butadiene rubber in liquid-latex form for addition to prepackaged dry-grout mix.
   2. Un-sanded grout mixture for joints 1/8 inch and narrower.
   3. Sanded grout mixture for joints 1/8 inch and wider.

M. Joint Grout, Epoxy Type: Provide chemical resistant, water cleanable, tile grouting epoxy, conforming to ANSI A118.3, as follows:
2. Colors: Architect will select form manufacturer’s standard color offering.

N. New Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

O. Existing Quarry Tile & Grout Cleaner:
1. DuPont Stone Tech Professional Heavy Duty Coating Stripper or KlenzAll (follow manufacturer instructions for application process).
2. Aqua Mix “1 & 2 Deep Clean” (follow manufacturer instructions for application process).
3. Quarry tile has an issue with mop heads as many quarry tiles are very abrasive. Old fashion string mops (cotton or rag material) and nylon mops will shred easily on a coarse or abrasive finish. Use stitched end (tailband) microfiber or looped end knits (rough surface heads), tube mop head rated for heavy-duty use.
4. Avoid using no-rinse enzymatic and organic acid-based cleaners as the combination of heat, contaminants and the acid and enzyme cleaner will cause the grout to become soft and permanently damaged.

2.2 ELASTOMERIC SEALANTS

A. General: Provide manufacturer’s standard chemically curing, elastomeric sealants of base polymer and characteristics indicated. Comply with applicable requirements in Section 07 92 00 - JOINT SEALANTS.
1. Use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.

C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.
1. Available Products:
   a. Dow Corning Corporation; Dow Corning 786.
   b. GE Silicones; Sanitary 1700.
   c. Tremco, Inc.; Tremsil 600.

D. Multipart, Pourable Urethane Sealant: ASTM C 920; Type M; Grade P; Class 25; Uses T, M, A, and, as applicable to joint substrates indicated.
1. Available Products:
2.3 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
   1. Verify that substrates for setting tile are firm; dry; clean; free of oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 Series of tile installation standards for installations indicated.
   2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
   3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

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

3.2 PREPARATION

A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.
B. Provide concrete substrates for tile floors that comply with flatness tolerances specified in referenced ANSI A108 Series of tile installation standards.
   1. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions. Use product specifically recommended by tile-setting material manufacturer.
   2. Remove protrusions, bumps, and ridges by sanding or grinding.

C. Blending: For tile exhibiting color variations within ranges selected during Sample submittals, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION, GENERAL

A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.


C. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.
   1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
F. Lay out tile wainscots to next full tile beyond dimensions indicated.

G. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
   1. Locate joints in tile surfaces directly above joints in concrete substrates.
   2. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 – JOINT SEALANTS.

H. Grout tile to comply with requirements of the following tile installation standards:
   1. For ceramic tile grouts (sand-portland cement; dry-set, commercial portland cement; and latex-portland cement grouts), comply with ANSI A108.10.
   2. For chemical-resistant epoxy grouts, comply with ANSI A108.6.

I. All interior corners both horizontal and vertical to be receive sealant joints in place of grout. Match grout color.

3.4 WATERPROOFING AND CRACK-SUPPRESSION MEMBRANE INSTALLATION

A. Install waterproofing to comply with ANSI A108.13 and waterproofing manufacturer’s written instructions to produce waterproof membrane of uniform thickness bonded securely to substrate.

B. Install crack-suppression membrane to comply with manufacturer’s written instructions to produce membrane of uniform thickness bonded securely to substrate.

C. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.5 FLOOR TILE INSTALLATION

A. General: Install tile to comply with requirements in the Floor Tile Installation Schedule, including those referencing TCA installation methods and ANSI A108 Series of tile installation standards.
   1. For installations indicated below, follow procedures in ANSI A108 Series tile installation standards for providing 95 percent mortar coverage.
   2. Install sealant at all plane intersections. Do not grout. Mask and tool sealant in accordance with manufacturer’s.
B. Stone Thresholds: Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile, unless otherwise indicated.
   1. Set thresholds in latex-portland cement mortar for locations where mortar bed would otherwise be exposed above adjacent non-tile floor finish.

C. Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.

3.6 WALL TILE INSTALLATION

A. Install types of tile designated for wall installations to comply with requirements in the Wall Tile Installation Schedule, including those referencing TCA installation methods and ANSI setting bed standards.

3.7 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
   1. Remove grout residue from tile as soon as possible.
   2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
   3. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

B. When recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.

C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed. After seven days, cover areas subject to construction traffic with heavy cardboard.

D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION
PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.1.1 FILED SUB-BIDS

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

B. Sub-bidders must be 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.

C. The Work of this section is shown on Drawings AD2.1 and A2.1.

D. Sub-Sub Trades
   1. Sub bid trades are not required.

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
   1. Acoustical ceiling tiles and panels.
   2. Suspension systems, grid systems and ceiling hangers.
   3. Acoustical sealant at edge moldings at acoustical ceilings.

B. Related Work: The following items are not included in this Section and are specified under the designated Sections:
   1. Section 092110 - GYPSUM BOARD ASSEMBLIES for gypsum board ceilings.
2. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING for air handling and distribution components located in ceilings.
3. Division 26 - ELECTRICAL for light fixture and alarm system components located in ceilings.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items. Show the following:
   1. Ceiling suspension members.
   2. Method of attaching hangers to building structure. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
   3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
   1. Acoustical Panel: Set of 6 inch square Samples of each type, color, pattern, and texture.
   2. Exposed Suspension System Members, Moldings, and Trim: Set of 12 inch long Samples of each type, finish, and color.

D. Asbestos Certification: Manufacturer's written certification that acoustical ceiling products contain no asbestos (0.0000%). Product labels indicating that it is the user’s responsibility to test the products for asbestos are unacceptable and sufficient cause for rejection of the product on site.

E. Maintenance Data: For finishes to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Source Limitations:
   1. Acoustical Ceiling Panels: Obtain each type through one source from a single manufacturer.
   2. Suspension Systems: Obtain each type through one source from a single manufacturer.

B. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:
   1. Fire-Resistance Characteristics: Where indicated, provide acoustical panel ceilings identical to those of assemblies tested for fire resistance
ACOUSTICAL CEILING SYSTEMS

per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

a. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.

b. Identify materials with appropriate markings of applicable testing and inspecting agency.

2. Surface-Burning Characteristics: Provide acoustical panels complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:

C. Mockups: Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.7 COORDINATION

A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them,
including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.8 WARRANTY

A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to the following:
   1. Acoustical Panels: Sagging and warping
   2. Grid System: Rusting and manufacturer's defects

B. Warranty Period:
   1. Acoustical panels: Ten (10) years from date of substantial completion
   2. Suspension: Ten (10) years from date of substantial completion
   3. Ceiling System: Thirty (30) years from date of substantial completion

C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Ceiling Panels:
   1. Armstrong World Industries, Inc. (Basis of Design)
   2. USG
   3. Certainteed

B. Suspension Systems:
   1. Armstrong World Industries, Inc. (Basis of Design)
   2. USG
   3. Certainteed

2.2 CEILING PANELS

A. Acoustical Panels Type AP:
   1. Surface Texture: Fine
   2. Composition: Mineral Fiber
   3. Color: White
4. Size: 24in X 24in X 5/8in
5. Edge Profile: Angled Tegular for interface with Prelude XL HRC.
6. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, 0.50.
7. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, 35
9. Flame Spread: ASTM E 1264; Class A (UL)
11. Dimensional Stability: HumiGuard Plus - Temperature is between 32°F (0° C) and 120°F (49° C). It is not necessary for the area to be enclosed or for HVAC systems to be functioning. All wet work (plastering, concrete, etc) must be complete and dry.
12. Antimicrobial Protection: BioBlock Plus - Resistance against the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.
13. Panel Basis of Design: DUNE, 1774 No added formaldehyde as manufactured by Armstrong

2.3 METAL SUSPENSION SYSTEMS

A. Components:
   1. Main beams and cross tees, base metal and end detail, fabricated from commercial quality hot dipped galvanized steel complying with ASTM A 653. Main beams and cross tees are double-web steel construction with type exposed flange design. Exposed surfaces chemically cleansed, capping prefinished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.
   2. Structural Classification: ASTM C 635 Intermediate Duty duty
   3. Color: White and match the actual color of the selected ceiling tile, unless noted otherwise.
   4. Sustainability: Environmental Product Declaration (EPD), Health Product Declaration (HPD)
   5. Acceptable Product: Equal to PRELUDE XL 15/16" Exposed Tee as manufactured by Armstrong World Industries

B. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.
1. Anchors in Concrete: Anchors with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency; zinc-plated for Class SC1 service.

2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

C. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft annealed, with a yield stress load of at least three times design load, but not less than 12 gauge.

D. Edge Moldings and Trim:
   1. 780036 - 12ft Hemmed Angle Molding

2.4 ACOUSTICAL SEALANT

A. Acoustical Sealant for Concealed Joints: Manufacturer's standard nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), recommended for sealing interior concealed joints to reduce airborne sound transmission.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Proceed with installation only after unsatisfactory conditions have been corrected.
3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

A. General: Install acoustical panel ceilings to comply with ASTM C 636 per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:
   1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
   2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, counter-splaying, or other equally effective means.
   3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
   4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
   5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
   6. Do not attach hangers to steel deck tabs.
   7. Space hangers not more than 48 o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.

C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
   1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.

3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

E. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
   1. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
   2. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions, unless otherwise indicated.

3.4 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members.

B. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION
09 65 10
RESILIENT FLOORING AND ACCESSORIES

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
1. Vinyl Composition Tile
2. Resilient wall base and accessories.

B. Related Work: The following items are not included in this Section and are specified under the designated Sections:
1. Section 09 68 13 - TILE CARPETING for carpet and accessories.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each type of floor covering. Include floor covering layouts, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
1. Show details of special patterns.

C. Samples for Verification: Full-size units of each color and pattern of resilient floor tile required.
1. Vinyl Composition Tile, Resilient wall base and accessories, Rubber Stair treads and stair accessories Manufacturer’s standard-size Samples, but not less than 12 inches long, of each resilient product color and pattern required.

D. Maintenance Data: For resilient products to include in maintenance manuals.

1.4 QUALITY ASSURANCE
A. Fire-Test-Response Characteristics: Provide products identical to those tested for fire-exposure behavior per test method indicated by a testing and inspecting agency acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50°F or more than 90°F. Store tiles on flat surfaces.

1.6 PROJECT CONDITIONS

A. Maintain temperatures within range recommended by manufacturer, but not less than 70°F or more than 95°F in spaces to receive floor tile during the following time periods:
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.

B. After post-installation period, maintain temperatures within range recommended by manufacturer, but not less than 55°F or more than 95°F.

C. Close spaces to traffic during floor covering installation.

D. Close spaces to traffic for 48 hours after floor covering installation.

E. Install resilient products after other finishing operations, including painting, have been completed.

1.7 APPLICABLE PUBLICATIONS

A. Vinyl Composition Tile
      a. D4078-02 (2008) - Water Emulsion Floor Finish
      b. E648-10 - Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source
      c. E662-09 - Specific Optical Density of Smoke Generated by Solid Materials
      d. E1155-96 (R2008) - Determining Floor Flatness and Floor Levelness Numbers
      e. F510-93 (R 2008) - Resistance to Abrasion of Resilient Floor Coverings Using an Abrader with a Grit Feed Method
f. F710-08 - Preparing Concrete Floors to Receive Resilient Flooring

g. F1066-04 (R2010) - Vinyl Composition Floor Tile

2. Resilient Floor Covering Institute (RFCI):
   a. IP #2 Installation Practice for Vinyl Composition Tile (VCT)

3. Federal Specifications (Fed. Spec.):
   a. SS-T-312 Tile Floor: Asphalt, Rubber, Vinyl and Vinyl Composition

B. Rubber Stair Treads and Stair Risers

1.8 WARRANTY

A. Manufacturer’s Warranty: Submit in name of Owner manufacturer’s standard warranty document executed by authorized company official.

1. Vinyl Composition Tile
   a. Five (5) years commencing on Date of Substantial Completion.

2. Rubber Stair Treads and Stair Risers:
   a. Ten (10) years commencing on Date of Substantial Completion.

3. Resilient wall base and accessories.
   a. Five (5) years commencing on Date of Substantial Completion.

B. Manufacturer’s warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.

PART 2 - PRODUCTS

2.1 VINYL COMPOSITION TILE and ADHESIVE

A. Vinyl Composition Tile:
   1. ASTM F1066,
   2. Composition Class 2 (through pattern).
   3. Size: 12 inches square.
   4. Thickness 1/8 inch.
5. Slip Resistance: ADA Compliant
6. ASTM F 970, Standard Test Method for Static Load Limit – 150 PSI
7. ASTM E 648, Standard Test method for Critical Radiant Flux of 0.45 watts/cm² or greater, Class I
8. NSF-332 Certified
9. Phthalate free
10. Style and Colors: As indicated on the Finish Schedule.

B. Adhesive:
   1. Two-Part Polyurethane Adhesive

### 2.2 RESILIENT WALL BASE

A. Wall Base: ASTM F 1861.
   1. Johnsonite
   3. Roppe Corporation

B. Description:
   1. Style and Colors: As indicated on the Finish Schedule.
   2. Type (Material Requirement): TS (rubber, vulcanized thermoset) or TP (rubber, thermoplastic).
   3. Shape: Straight (toeless) at carpet and coved at resilient flooring.
   4. Minimum Thickness: 0.125 inch.
   5. Height: 4 inches.
   6. Lengths: Cut lengths 48 inches long or coils in manufacturer's standard length.
   7. Outside Corners: Premolded.
   8. Inside Corners: Premolded.

### 2.3 RESILIENT MOLDING ACCESSORIES

A. Types Include the Following as Applicable: Cap for cove carpet, cap for cove resilient sheet floor covering, carpet edge for glue-down applications, nosing for carpet, nosing for resilient floor covering, reducer strip for resilient floor covering, joiner for tile and carpet
   1. Johnsonite
   2. Roppe Corporation

B. Material: Rubber.

C. Profile and Dimensions: As indicated on finish schedule.
2.4 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, Portland cement based or blended hydraulic cement based formulation provided or approved by resilient product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.
   1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
      a. VCT Adhesives: 50 g/L.
      b. Cove Base Adhesives: 50 g/L.
      c. Rubber Floor Adhesives: 60 g/L.

C. Seamless-Installation Accessories:
      a. Color: Match floor covering.
   2. Chemical-Bonding Compound: Manufacturer's product for chemically bonding seams.

D. Cleavage Membrane for VCT installation: Polyethylene sheeting, ASTM D 4397, 4.0 mils thick.

F. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of tiles, and in maximum available lengths to minimize running joints.

G. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance.
   1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
   2. Proceed with installation only after unsatisfactory conditions have been corrected.
3.2 PREPARATION

A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of resilient products.

B. Substrates: Prepare according to ASTM F 710.
   1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
      a. A pH test for alkalinity must be conducted.
         i. Results shall range between 7 and 9.
         ii. If the test results are not within the acceptable range of 7 to 9, the installation must not proceed until the condition has been corrected.
      b. Proceed with installation only after substrates pass testing.
   3. Moisture Testing:
      a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
      b. Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

C. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

D. Access Flooring Panels: Remove protective film of oil or other coating using method recommended by access flooring manufacturer.

E. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.

F. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
   1. Do not install resilient products until they are same temperature as space where they are to be installed.

G. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.
H. Install cleavage membrane in accordance with manufacturer’s recommendations.

3.3 VINYL COMPOSITION TILE and ADHESIVE

A. Vinyl Composition Tile:
   1. ASTM F1066,
   2. Composition Class 2 (through pattern).
   3. Size: 12 inches square.
   4. Thickness 1/8 inch.
   5. Slip Resistance: ADA Compliant
   6. ASTM F 970, Standard Test Method for Static Load Limit – 150 PSI
   7. ASTM E 648, Standard Test method for Critical Radiant Flux of 0.45 watts/cm2 or greater, Class I
   8. NSF-332 Certified
   9. Phthalate free

B. Adhesive:
   1. Two-Part Polyurethane Adhesive

3.4 RESILIENT WALL BASE INSTALLATION

A. Smooth wall surfaces, removing rough areas, projections, ridges, and bumps, and filling low spots, control or construction joints, and other defects with Armstrong S-184 Fast-Setting Cement-Based Patch and Skim Coat, or S-194 Fast-Setting Cement-Based Patch and Underlayment or equal products as recommended by the flooring manufacturer.

B. Remove paint, varnish, oils, release agents, sealers, and waxes. Remove residual adhesives.
   1. Remove curing and hardening compounds not compatible with the adhesives used, as indicated by a bond test or by the compound manufacturer's recommendations for wall base.
   2. Do not use organic solvents.

C. Perform Bond Tests to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and other coatings; and ready to receive wall base.

D. Apply wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
E. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

F. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

G. Do not stretch wall base during installation.

H. On masonry surfaces or other similar irregular substrates, fill voids along top edge of wall base with manufacturer’s recommended adhesive filler material.

I. Pre-molded Corners: Install pre-molded corners before installing straight pieces.

J. Adhesives
   1. Install with Armstrong S-725 Wall Base Adhesive or equal at the wall base as recommended by the wall base manufacturer.
   2. Provide a solvent-based contact adhesive to bond wall base to outside corners.

3.5 RESILIENT ACCESSORY INSTALLATION

A. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece.

B. Install reducer strips at edges of floor coverings that would otherwise be exposed.

3.6 CLEANING AND PROTECTION

A. Perform the following operations immediately after completing resilient product installation:
   1. Remove adhesive and other blemishes from exposed surfaces.
   2. Sweep and vacuum surfaces thoroughly.
   3. Damp-mop surfaces to remove marks and soil.
      a. Do not wash surfaces until after time period recommended by manufacturer.

B. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.
   1. Apply protective floor polish to horizontal surfaces that are free from soil, visible adhesive, and surface blemishes if recommended in writing by manufacturer.
a. Coordinate selection of floor polish with the Owner’s maintenance service.
2. Cover products installed on horizontal surfaces with undyed, untreated building paper until Substantial Completion.
3. Do not move heavy and sharp objects directly over surfaces. Place hardboard or plywood panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

END OF SECTION
PART 1 – GENERAL

1.1 GENERAL PROVISIONS

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

1.2 DESCRIPTION OF WORK

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

1. Modular carpet tile.
2. Modular Carpet accessories.

B. Related Work: The following items are not included in this Section and are specified under the designated Sections:

1. Section 09 65 00 – RESILIENT FLOORING & ACCESSORIES for resilient wall base and accessories installed with Modular Carpet.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include manufacturer’s written data on physical characteristics, durability, and fade resistance. Include installation recommendations for each type of substrate.

B. Shop Drawings: Show the following:

1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
2. Carpet tile type, color, and dye lot.
3. Type of subfloor.
4. Type of installation.
5. Pattern of installation.
6. Pattern type, location, and direction.
7. Pile direction.
8. Type, color, and location of insets and borders.
9. Type, color, and location of edge, transition, and other accessory strips.
10. Transition details to other flooring materials.
C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer’s name, material description, color, pattern, and designation indicated on Drawings and in schedules.
   2. Exposed Edge, Transition, and other Accessory Stripping: 12-inch-long Samples.

D. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

E. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
   1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
   2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.4 QUALITY ASSURANCE


B. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.

C. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with CRI Carpet Installation Standard, Section 5, "Storage and Handling."

1.6 PROJECT CONDITIONS

A. General: Comply with CRI Carpet Installation Standard, Section 7, "Site Conditions."

B. Environmental Limitations: Do not install carpet tiles until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

D. Where equipment or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.7 WARRANTY

A. Special Carpet Warranty: Written warranty, signed by carpet manufacturer agreeing to replace carpet that does not comply with requirements or that fails within specified warranty period.

B. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination.

1. Warranty Period: Ten (10) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MODULAR CARPET

A. Products: Subject to compliance with requirements, provide carpet tile as indicated in the Finish Schedule in the Drawings and as approved by the Architect.

B. Design is based on the following:
   ▪ Manufacturer: Mohawk Group
   ▪ Collection: Sketch Effect
   ▪ Style Name: Framed Structure/ BT436
   ▪ Color: 237 Steel
   ▪ Fiber Type: Colorstrand ©SD Nylon
   ▪ Size: 24” x 24”
   ▪ Dyed Method: Solution Dyed
   ▪ Installation Method: Monolithic

C. Carpets installed in the building interior shall meet the testing and product requirements of CRI Carpet and Rug Institute’s “Green Label Plus” program.

D. Subject to compliance with requirements, modular carpet systems from other manufacturers meeting the specified requirements may be acceptable.
2.2 INSTALLATION ACCESSORIES

A. Carpet tiles to be installed with “FlexLok” tab adhesive system

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.

B. Concrete Subfloors: Comply with CRI Carpet Installation Standard, Section 9, “Testing Concrete Substrates.” Verify that concrete slabs comply with ASTM F 710 and the following:
   1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
   2. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

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

3.2 PREPARATION

A. General: Comply with CRI Carpet Installation Standard, Section 7.3, "Site Conditions; Floor Preparation," and carpet manufacturer’s written installation instructions for preparing substrates indicated to receive carpet tile installation.

B. Use trowelable leveling and patching compounds, according to manufacturer’s written instructions, to fill cracks, holes, depressions, and protrusions in substrates.

C. Broom and vacuum clean substrates to be covered immediately before installing carpet. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. General: Comply with CRI Carpet Installation Standard, Section 18, "Modular Carpet," and with carpet tile manufacturer’s written installation instructions.
B. Installation Method: Comply with Mohawk FlexLok installation procedures.

C. Maintain dye lot integrity. Do not mix dye lots in same area.

D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, non-staining marking device.

G. Install pattern parallel to walls and borders.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:
   1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
   2. Remove yarns that protrude from carpet tile surface.

B. Protect installed carpet tile to comply with CRI Carpet Installation Standard, Section 20, "Protecting Indoor Installations".

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION
PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.1.1 Filed Sub-bids

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

B. Sub-bidders must be 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.

C. The Work of this section is shown on Drawings A10.1 through A10.2.

D. Sub-Sub Trades
   1. Sub bid trades are not required.

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
   1. Field painting of exposed interior items and surfaces including gypsum board walls and ceilings.
   2. Field Staining and coating interior wood surfaces
   3. Field application of transparent finishes
   4. Field painting of exposed exterior items and surfaces.
   5. Surface preparation for painting.

1.3 Related Work Specified Elsewhere:

A. The following related work or materials shall be provided under the designated Sections and coordinated by the Contractor:
   1. Section 06 20 00 - FINISH CARPENTRY
2. Section 07 92 00 - JOINT SEALANTS
3. Section 08 10 00 – DOORS & FRAMES
4. Section 09 21 10 - GYPSUM WALLBOARD ASSEMBLIES

1.4 REFERENCES

A. Paint Quality Institute [www.paintquality.com]
B. Master Painters Institute [www.mpi.net]
C. SSPC-SP 1 - Solvent Cleaning.
D. SSPC-SP 2 - Hand Tool Cleaning.
E. SSPC-SP 3 - Power Tool Cleaning.

1.5 DEFINITIONS AND EXTENT

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

B. This Section includes surface preparation and field painting of exposed exterior and interior items and surfaces.
   1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

C. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.

D. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
   1. Prefinished items include the following factory-finished components:
      a. Architectural woodwork.
      b. Acoustical wall panels.
      c. Toilet enclosures.
      d. Finished mechanical and electrical equipment.
      e. Light fixtures.
2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
   a. Furred areas.
   b. Ceiling plenums.
   c. Pipe spaces.
   d. Duct shafts.

3. Finished metal surfaces include the following:
   a. Anodized aluminum.
   b. Stainless steel.
   c. Chromium plate.
   d. Copper and copper alloys.
   e. Bronze and brass.

4. Operating parts include moving parts of operating equipment and the following:
   a. Valve and damper operators.
   b. Linkages.
   c. Sensing devices.
   d. Motor and fan shafts.

5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

1.6 SUBMITTALS

A. Product Data: For each paint system indicated. Include block fillers and primers.
      Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer’s catalog number and general classification.
   2. Manufacturer’s Information: Manufacturer’s technical information, including label analysis and instructions for handling, storing, and applying each coating material.

B. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.
   1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
   2. Provide a list of materials and applications for each coat of each Sample. Label each Sample for location and application.
   3. Submit two eight inch by 12 inch Samples for each type of finish coating for Architect’s review of color and texture only.
D. Qualification Data: For Applicator.

1.7 QUALITY ASSURANCE

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

B. Source Limitations: Obtain fillers and primers for each coating system from the same manufacturer as the finish coats.

C. Mockups: Provide a full-coat benchmark finish sample for each type of coating and substrate required. Comply with procedures specified in PDCA P5. Duplicate finish of approved sample Submittals.
   1. Architect will select one room or surface to represent surfaces and conditions for application of each type of coating and substrate.
      a. Wall Surfaces: Provide samples on at least 100 sq. ft.
      b. Small Areas and Items: Architect will designate items or areas required.
   2. Apply benchmark samples, according to requirements for the completed Work, after permanent lighting and other environmental services have been activated. Provide required sheen, color, and texture on each surface.
      a. After finishes are accepted, Architect will use the room or surface to evaluate coating systems of a similar nature.
   3. Final approval of colors will be from benchmark samples.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
   1. Product name or title of material.
   2. Product description (generic classification or binder type).
   3. Manufacturer's stock number and date of manufacture.
   4. Contents by volume, for pigment and vehicle constituents.
   5. Thinning instructions.
   6. Application instructions.
   7. Color name and number.
   8. VOC content.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45°F. Maintain storage containers in a clean condition, free of foreign materials and residue.
1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

1.9 PROJECT CONDITIONS
A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90°F.

B. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95°F.

C. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5°F above the dew point; or to damp or wet surfaces.

Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

PART 2 - PRODUCTS

MANUFACTURERS

A. Acceptable Manufacturers:
   a. Sherwin Williams (S-W)
   b. Benjamin Moore
   c. ICI Dulux
   d. Pittsburgh

B. Basis of Design: Subject to compliance with requirements, products identified below form the basis of design. These products and other products with matching performance specifications and characteristics may be incorporated into the Work:
   a. Exterior Metals
      i. Primer: Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer, B66-310 Series. (5.0 mils wet, 2.0 mils dry)
      ii. Second Coat: Sherwin-Williams Pro Industrial Urethane Enamel, B54-150 Series. (3.5 mils wet, 2.0 mils dry per coat)
      iii. Finish Coat: Sherwin-Williams Pro Industrial Urethane Enamel, B54-150 Series. (3.5 mils wet, 2.0 mils dry per coat)
b. Exterior Wood - (Siding, Trim, Shutters, Sashes, Misc., Hardboard-Bare/Primed)
   i. 1. Latex Systems
      1. Semi-Gloss Finish
         a. 1st Coat: S-W Exterior Latex Wood Primer, B42W8041 (4.0 mils wet, 1.4 mils dry)
         b. 2nd Coat: S-W Solo Acrylic Semi-Gloss, A76 Series
         c. 3rd Coat: S-W Solo Acrylic Semi-Gloss, A76 Series (4.0 mils wet, 1.5 mils dry per coat)

c. Interior Metals:
   ii. Second Coat: Sherwin-Williams Pro-Cryl Urethane Alkyd Enamel B54-150 Series. (2-4 mils dry).
   iii. Finish Coat: Sherwin-Williams Pro-Cryl Urethane Alkyd Enamel B54-150 Series. (2-4 mils dry).

d. Interior Gypsum Walls (Unit living rooms, bedrooms; Community Building areas within scope of work other than toilet rooms and kitchen areas)
   i. Latex Systems:
      1. Eg-Shel / Satin Finish:
         a. 1st Coat: S-W ProMar 200 Zero VOC Interior Latex Primer, B28W2600 (4 mils wet, 1.5 mils dry).
         c. 3rd Coat: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series (4 mils wet, 1.7 mils dry per coat).
      2. Eg-Shel / Satin Finish: Dark Colors
         a. 1st Coat: S-W Premium Wall & Wood Interior Latex Primer, B28W08111 (4 mils wet, 1.8 mils dry).
         b. 2nd Coat: S-W Emerald Interior Latex Satin, K37 Series.
         c. 3rd Coat: S-W Emerald Interior Latex Satin, K37 Series (4 mils wet, 1.7 mils dry per coat). Interior Gypsum Walls (community room; hallways):

e. Interior Gypsum Walls and Ceilings (Unit bathrooms, kitchens, utility rooms; Community Bldg Toilet Rooms and Kitchen):
   i. Latex Systems:
      1. Semi-gloss Finish:
         a. 1st Coat: S-W ProMar 200 Zero VOC Interior Latex Primer, B28W2600 (4 mils wet, 1.5 mils dry).
         c. 3rd Coat: S-W ProMar 200 Zero VOC Latex Semi-gloss, B20-2600 Series (4 mils wet, 1.7 mils dry per coat).
f. Interior Ceilings: (Unit living rooms, bedrooms; Community Building areas within scope of work other than toilet rooms and kitchen areas)
   i. Latex Systems:
      1. Flat Finish:
         a. 1st Coat: S-W ProMar 200 Zero VOC Interior Latex Primer, B28W2600 (4 mils wet, 1.5 mils dry).
         c. 3rd Coat: S-W ProMar 200 Zero VOC Latex Flat, B20-2600 Series (4 mils wet, 1.7 mils dry per coat).

g. Interior Opaque Finished Wood:
   i. Latex Systems:
      1. Eg-Shel / Satin Finish:
         a. 1st Coat: S-W Premium Wall and Wood Primer, B28W8111 (4 mils wet, 1.8 mils dry).
         b. 2nd Coat: S-W Harmony Eg-Shel, B09 Series.
         c. 3rd Coat: S-Wharmony Eg-Shel, B09 Series (@ 4 mils wet; 1.7 mils dry dry per coat).

a. Interior Transparent Finishes:
   i. Water Reducible Polyurethane
      1. Clear Finish
         a. 1st Coat: S-W Minwax® Waterbased Oil-Modified Polyurethane
         b. 2nd Coat: S-W Minwax® Waterbased Oil-Modified Polyurethane (Satin)

Alternate:
   a. 1st Coat: S-W Minwax Minwax Polycrylic Protective Finish
   b. 2nd Coat: S-W Minwax Minwax Polycrylic Protective Finish (Satin)

b. Interior Stained Wood:
   i. Wood Interior Systems (vertical) Semi-Transparent Stain
      1. Water Reducible Polyurethane (topcoat) a Semi-Transparent Stain:
         a. 1st Coat: S-W Minwax Performance Series Tintable Wood Stain 250 VOC (Optional) Or S-W Minwax Performance Series Tintable Wood Stain 550 VOC (Optional)
         b. 2nd Coat: S-W Minwax Waterbased Oil-Modified Polyurethane 3rd Coat: S-W Minwax Waterbased Oil-Modified Polyurethane (Gloss, Semi-Gloss, Satin)
Alternate

b. 1st Coat: S-W Minwax Performance Series Tintable Wood Stain 250 VOC (Optional)  Or S-W Minwax Performance Series Tintable Wood Stain 550 VOC (Optional)

d. 2nd Coat: S-W Minwax® Minwax Polycrylic Protective Finish  3rd Coat: S-W Minwax® Minwax Polycrylic Protective Finish  (Satin)

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer’s best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer’s product identification will not be acceptable.

   1. Proprietary Names: Use of manufacturer’s proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer’s material data and certificates of performance for proposed substitutions.

C. VOC Content for Interior Paints and Coatings: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

   1. Flat Paints and Coatings: 50 g/L.
   2. Non-flat Paints and Coatings: 150 g/L.
   3. Dry-Fog Coatings: 400 g/L.
   4. Primers, Sealers, and Undercoaters: 200 g/L.
   5. Anticorrosive and Antitrust Paints Applied to Ferrous Metals: 250 g/L.
   7. Pretreatment Wash Primers: 420 g/L.
   8. Floor Coatings: 100 g/L.
   9. Shellacs, Clear: 730 g/L.
   10. Shellacs, Pigmented: 550 g/L.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application.
   1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
   2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
   1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning.
   1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
   1. Provide barrier coats over incompatible primers or remove and re-prime.
   2. Cementitious Materials: Prepare concrete, concrete unit masonry, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
      a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
      b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this
condition before application. Do not paint surfaces if moisture content exceeds that permitted in manufacturer's written instructions.

c. Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.

3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.

a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.

b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.

c. If transparent finish is required, back-prime with spar varnish.

d. Back-prime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on back side.

e. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.

4. Ferrous Metals: Clean un-galvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.

a. Blast steel surfaces clean as recommended by paint system manufacturer and according to SSPC-SP 6/NACE No. 3.

b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.

5. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

D. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.

2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.

3. Use only thinners approved by paint manufacturer and only within recommended limits.
E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Paint colors, surface treatments, and finishes are indicated in the paint schedules.
2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
3. Provide finish coats that are compatible with primers used.
4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convектор covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with primer coat only.
6. Paint interior surfaces of ducts with a flat, non-specular black paint where visible through registers or grilles.
7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
8. Finish exterior doors and doors in wet areas on tops, bottoms, and side edges the same as exterior faces.
9. Sand lightly between each succeeding enamel or varnish coat.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
2. Omit primer over metal surfaces that have been shop primed and touchup painted.
3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners,
crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
   1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
   2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
   3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.

D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.

E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.

F. Mechanical items to be painted include, but are not limited to, the following:
   1. Uninsulated metal piping.
   2. Uninsulated plastic piping.
   3. Pipe hangers and supports.
   4. Tanks that do not have factory-applied final finishes.
   5. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
   6. Duct, equipment, and pipe insulation having "all-service jacket" or other paintable jacket material.
   7. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

G. Electrical items to be painted include, but are not limited to, the following:
   1. Electrical equipment that is indicated to have a factory-primed finish for field painting.

H. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

I. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where
evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

J. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

K. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections. 1. Provide satin finish for final coats.

L. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 FIELD QUALITY CONTROL

A. The Owner reserves the right to invoke the following test procedure at any time and as often as the Owner deems necessary during the period when paint is being applied:
   1. The Owner will engage a qualified independent testing agency to sample paint material being used. Samples of material delivered to Project will be taken, identified, sealed, and certified in the presence of Contractor.
   2. Testing agency will perform appropriate tests for the following characteristics as required by the Architect.
   3. The Architect may direct Contractor to stop painting if test results show material being used does not comply with specified requirements. Contractor shall remove noncomplying paint from Project site, pay for testing, and repaint surfaces previously coated with the noncomplying paint. If necessary, Contractor may be required to remove noncomplying paint from previously painted surfaces if, on repainting with specified paint, the two coatings are incompatible.

3.5 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.
   1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.
3.6 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.
   1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.7 PAINT SCHEDULE

A. Schedule: Provide products and number of coats specified. Use of manufacturer's proprietary product names to designate colors, materials, generic class, standard of quality and performance criteria and is not intended to imply that products named are required to be used to the exclusion of equivalent performing products of other manufacturers.

END OF SECTION
1.1 GENERAL PROVISIONS

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

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete
   the work of this Section, including but not limited to the following:
   1. Code-required interior panel signage, including but not limited to,
      accessibility signage, toilet room signage and electrical room signage.
   2. Signage for each room within the scope of work in addition to the code
      required signage noted above.
   3. Two Interior Building Directories located inside the northern entrance at
      Corridor 104 (near elevator) and inside the southern entrance at Stair
      Lobby 133.
   4. Exterior entrance signage at each of the four entrances to the building.

B. Related Work: The following items are not included in this Section and are
   specified under the designated Sections:
   1. Division 26 - ELECTRICAL for illuminated exit signs.

1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of
   individual components and profiles, and finishes for each type of sign.

B. Shop Drawings: Include plans, elevations, and large-scale sections of typical
   members and other components. Show mounting methods, grounds, mounting
   heights, layout, spacing, reinforcement, accessories, and installation details.
   1. Provide message list for each sign, including large-scale details of
      wording, lettering, artwork, and braille layout.

C. Samples for Verification: For each type of sign, include the following Samples to
   verify color selected:
   1. Panel Signs: Full-size Samples of each type of sign required.
   2. Approved samples will not be returned for installation into Project.

D. Maintenance Data: For signage cleaning and maintenance requirements to
   include in maintenance manuals.
1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each sign type through one source from a single manufacturer.

B. Regulatory Requirements: Comply with the Massachusetts Architectural Access Board, Americans with Disabilities Act (ADA) and with code provisions as adopted by authorities having jurisdiction.

1.5 PROJECT CONDITIONS

A. Field Measurements: Where sizes of signs are determined by dimensions of surfaces on which they are installed, verify dimensions by field measurement before fabrication and indicate measurements on Shop Drawings.

1.6 COORDINATION

A. For signs supported by or anchored to permanent construction, advise installers of anchorage devices about specific requirements for placement of anchorage devices and similar items to be used for attaching signs.

PART 2 - PRODUCTS

2.1 PANEL SIGNS

A. General: Provide signs that comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction as indicated. Produce smooth panel sign surfaces constructed to remain flat under installed conditions within tolerance of plus or minus 1/16 inch measured diagonally.

B. Provide the following:

1. Code-Required Signs for Certificate of Occupancy:
   a. Type: Photopolymer on acrylic or printed acrylic / aluminum as applicable.
   b. Color: Selected from manufacturer’s standard colors including metallic silver, off white, champagne, light gray, dark red, dark green, dark blue, dark bronze, charcoal.
   c. Color: Custom color as selected.
   d. Type Size: As selected.
   e. Typeface: As selected.
   f. Symbols of Accessibility: Provide 6-inch- high symbol fabricated from opaque non-reflective vinyl film, 0.0035-inch nominal
thickness, with pressure-sensitive adhesive backing suitable for both exterior and interior applications.

2. Interior Signs Based on Owner’s Requirements (one room sign per room within area of work in addition to signage noted in Item 1 above):
   a. Type: Photopolymer on acrylic or printed acrylic as applicable.
   b. Color: Selected from manufacturer’s standard colors including metallic silver, off white, champagne, light gray, dark red, dark green, dark blue, dark bronze, charcoal.
   c. Color: Custom color as selected.
   d. Type Size: As selected.
   e. Typeface: As selected.
   f. Tactile and Braille Copy: Manufacturer’s standard process for producing copy complying with ADA Accessibility Guidelines and ICC/ANSI A117.1. Text shall be accompanied by Grade 2 braille. Produce precisely formed characters with square cut edges free from burrs and cut marks.

3. Exterior Signs:
   a. Type: Exterior entrance signage at each of the four entrances to the building with name of entrance, including:
      i. New Bedford Council on Aging
      ii. Entrance 1 (to Stair 133)
      iii. Entrance 2 (to Corridor 101)
      iv. Entrance 3 (to Corridor 102)
   b. Wall: Fabricated aluminum panel dimensional raised individual graphics and non-illuminated. (Externally illuminated under the Electrical Work.)
   c. Tactile and Braille Copy: Manufacturer’s standard process for producing copy complying with ADA Accessibility Guidelines and ICC/ANSI A117.1. Text shall be accompanied by Grade 2 braille. Produce precisely formed characters with square cut edges free from burrs and cut marks.

4. Specialty Signs:
   a. Type: Two Interior Building Directories located inside the northern entrance at Corridor 102 (near elevator) and inside the southern entrance at Stair Lobby 133.
      i. Directory signs to include:
         A. interchangeable name plates for each department within the building;
         B. expansion for future tenant names
   b. Tactile and Braille Copy: Manufacturer’s standard process for producing copy complying with ADA Accessibility Guidelines and ICC/ANSI A117.1. Text shall be accompanied by Grade 2 braille. Produce precisely formed characters with square cut edges free from burrs and cut marks.
2.2 ACCESSORIES

A. Interior Mounting Methods: Use double-sided vinyl tape fabricated from materials that are not corrosive to sign material and mounting surface.

B. Exterior Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Verify that items provided under other sections of Work are sized and located to accommodate signs.

C. Examine supporting members to ensure that surfaces are at elevations indicated or required to comply with authorities having jurisdiction and are free from dirt and other deleterious matter.

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

3.2 INSTALLATION

A. General: Locate signs and accessories where indicated, using mounting methods of types described and in compliance with manufacturer's written instructions.
   1. Install signs level, plumb, and at heights indicated, with sign surfaces free from distortion and other defects in appearance.
   2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches of sign without encountering protruding objects or standing within swing of door.

B. Interior Wall-Mounted Panel Signs: Attach panel signs to wall surfaces using methods indicated below:
1. Vinyl-Tape Mounting: Use double-sided foam tape to mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.

C. Exterior Wall-Mounted Signs: per manufacturer’s recommended mounting methods.

3.3 CLEANING AND PROTECTION

A. After installation, clean soiled sign surfaces according to manufacturer’s written instructions.

B. Protect signs from damage until Substantial Completion.

END OF SECTION
PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
   1. Factory finished metal toilet compartments and screens, floor and wall mounted.

B. Related Work: The following items are not included in this Section and are specified under the designated Sections:
   1. Section 05 50 00 - METAL FABRICATIONS for toilet partition framing steel supports.

1.3 PERFORMANCE REQUIREMENTS

A. 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. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.


G. International Code Council (ICC)/American National Standards Institute (ANSI):
1. ICC/ANSI A117.1 - Accessible and Usable Buildings and Facilities, as applicable to toilet compartments designated as accessible.

H. ADA - Americans with Disabilities Act

I. Commonwealth of Massachusetts Building Code:
   1. 9th Edition including all appendices.

1.4 SUBMITTALS

A. Product Data:
   1. Manufacturer's data sheets for each type of product indicated. Include fabrication details, description of materials and finishes.
   2. Product Test Reports:
      a. Documentation by qualified independent testing agency indicating compliance of products with requirements.

B. Shop Drawings:
   1. Include overall product dimensions, floor plan, elevations, sections, details, and attachments to other work.

C. Samples for Selection:
   1. Furnish samples of manufacturer's full range of colors for initial selection.
   2. Samples for Verification:
   3. Furnish physical sample of material in selected color.
   4. Size: 2 by 2 inch minimum.
   5. In finish specified.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Manufacturer with minimum of five (5) years of experience in the manufacture of toilet compartments.

B. Installers Qualifications:
   1. Experienced Installer regularly engaged in installation of toilet compartments for minimum three (3) years.

C. Source Limitations:
   1. Obtain toilet compartment components and accessories from single manufacturer.
1.6 DELIVERY, STORAGE, and HANDLING

A. Do not deliver toilet compartments to site until building is enclosed and HVAC systems are fully operational and the storage and installation space are conditioned at a constant temperature and humidity.

B. Deliver toilet compartments in manufacturer’s original packaging.

C. Store in an upright position.

1.7 WARRANTY

A. Special Manufacturer’s Warranty:
   1. Provide manufacturer’s standard form in the name of the Owner in which manufacturer agrees to repair or replace products that fail in materials or workmanship during the following period after substantial completion:
   2. Baked Enamel Toilet Partitions:
      a. Against rust-out: Fifteen (15) years.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. Manufacturers:
   1. Manufacturer in compliance with requirements of this Specification.
      a. Accurate Partitions Corp.
         PO Box 287
         Lyons, IL 60534-0287
         Phone:  708.442.6800
         Fax: 708.442.7439

      b. Flush Metal Partitions, LLC
         260 Spagnoli Road
         Melville, NY 11747
         631-768-8301 (voice)
         631-768-8351 (fax)
         info@flushmetal.com

      c. Global Partitions
         Eastanollee, GA 30538.

      d. Hadrian Inc.
         7420 Clover Avenue

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TOILET COMPARTMENTS
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B. Materials:
1. Metallic Coated Steel Sheet:
   a. ASTM A 653/A 653M, galvannealed commercial steel sheet suitable for exposed applications.
   b. Provide with mill phosphatized surface.
   c. Provide smooth material, without creases or ripples.
2. Zinc Aluminum Magnesium and Copper Alloy (Zamac): ASTM B 86.
3. Stainless Steel Sheet:
   a. ASTM A 240 or A 666, 300 series.
4. Stainless Steel Castings:
   a. ASTM A 743/A 743M.
5. Aluminum:
   a. ASTM B 221.

2.2 STEEL TOILET COMPARTMENTS

A. Toilet Compartment Type:
   1. Floor mounted.

B. Urinal Screen Style:
   1. Wall hung.

2.3 DOOR, PANEL, AND PILASTER CONSTRUCTION, GENERAL

A. Form edges with interlock to provide watertight fit without crown molding.

B. Braze corners and finish smooth.

C. Provide exposed surfaces free of pitting, visible seams and fabrication marks, stains, telegraphing of core material, or other imperfections.

D. Core Material:
   1. Manufacturer's standard sound-deadening, water resistant honeycomb in thickness required to provide finished thickness for doors, panels and pilasters.

E. Door Construction:
   1. 1 inch thick, constructed from 0.0313 inch/22 ga galvannealed steel.
2. Provide each door with internal 0.0625 inch/16 ga (1.59 mm) and 0.0781 inch/14 ga welded reinforcements at top and bottom hinge locations, with factory installed concealed true gravity cam hinges.

F. Panel Construction:
1. 1 inch thick, constructed from 0.0313 inch/22 ga galvannealed steel.
2. Grab-Bar Reinforcement:
   a. Provide concealed internal reinforcement for grab bars mounted on units.
3. Tapping Reinforcement:
   a. Provide concealed reinforcement for drilling and tapping holes at locations where machine screws are used for attaching items to units.

G. Pilaster Construction:
1. 1 1/4 inch thick, constructed from 0.0375 inch/20 gauge galvannealed steel.
2. Provide pilaster with internally welded reinforcement suitable to accept minimum 8 inch long, 3/8 inch zinc-plated jack bolt for leveling.

H. Head Rail:
1. Extruded anodized aluminum head rail with anti-grip profile.
2. Provide clamps for attachment to pilaster and stainless steel brackets to secure to wall.

2.4 URINAL-SCREEN CONSTRUCTION

A. Matching toilet compartment panel construction

2.5 STEEL SHEET FINISH

A. Manufacturer's standard baked-on finish, with one color in each room.

B. Color: As specified in Finish Schedule.

2.6 HARDWARE

A. Manufacturer's standard duty chrome-plated zamac castings, including corrosion-resistant, tamper-resistant fasteners:

B. Hinges:
1. Self-closing wrap-around gravity-type.
2. Adjustable to hold doors open at any angle up to 90 degrees.
3. Emergency access by lifting door.
C. Latch and Keeper:
   1. Concealed turn knob latch
   2. Wrap-around rubber-faced combination door strike and keeper,
   3. Provision for emergency access
   4. Latch and keeper to meet requirements for accessibility at all compartments.

D. Coat Hook:
   1. Combination hook and rubber-tipped stop
   2. Sized to prevent door from hitting compartment-mounted accessories.
   3. Provide wall bumper where door abuts wall.
   4. Provide formed L-shaped hook without stop at outswing doors.
   5. Mount with stainless steel through-bolts.

E. Door Pull:
   1. Standard unit on outside of inswing doors.
   2. Provide pulls on both sides of outswing doors.

2.7 FABRICATION

A. Floor Mounted Compartments:
   1. Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for connection to floor.
   2. Provide sleeves at bottoms of pilasters to conceal anchorage.

B. WALL HUNG URINAL SCREENS
   1. Provide manufacturer's standard corrosion-resistant anchoring assemblies

C. Door Size and Swings:
   1. Unless otherwise indicated or required, provide 26-inch-wide, in-swinging doors for standard toilet compartments and 36-inch-wide, out-swinging doors with a minimum 32-inch-wide clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine work area to verify that measurements, substrates, supports, and environmental conditions are in accordance with manufacturer's requirements to allow installation.
B. Proceed with installation once conditions meet manufacturer’s requirements.

3.2 INSTALLATION

A. General:
   1. Comply with manufacturer’s written installation instructions.
   2. Install units rigid, straight, level, and plumb.
   3. Secure units in position with manufacturer’s recommended anchoring devices.
   4. Install toilet partitions and screens only in spaces with operating, temperature controlled HVAC systems.

B. Clearances:
   1. Install with clearances indicated on Drawings.
   2. Where clearances are not indicated:
      3. Allow maximum 1/2 inch between pilasters and panels, and 1 inch between panels and walls.

C. Hardware Adjustment
   1. Adjust and lubricate hardware according to hardware manufacturer’s written instructions for proper operation.
   2. Set hinges on in-swinging doors to hold doors open approximately 15 degrees from closed position when unlatched.
   3. Set hinges on out-swinging doors to return doors to fully closed position.
   4. Set hinges on accessible compartments in accordance with governing requirements.

3.3 FINAL CLEANING

A. Remove packaging and construction debris and legally dispose of off-site.

B. Clean partition and screen surfaces with materials and cleansers in accordance with manufacturer’s recommendations.

END OF SECTION
PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
   1. Toilet accessories as scheduled on the Drawings.
      a. Includes MAAB required grab bars.
      b. Include frameless glass mirror
   2. Baby changing station.
   3. Coordinate needed blocking to support loading and rough frame openings as required.

B. Related Work: The following items are not included in this Section and are specified under the designated Sections:
   1. Section 06 10 00 - ROUGH CARPENTRY for blocking.
   2. Section 08 80 00 – GLAZING for mirror specification

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include the following:
   1. Construction details and dimensions.
   2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
   3. Material and finish descriptions.
   4. Features that will be included for Project.
   5. Manufacturer's warranty.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
   1. Identify locations using room designations indicated on Drawings.
   2. Identify products using designations indicated on Drawings.

C. Maintenance Data: For toilet accessories to include in maintenance manuals.
1.4 QUALITY ASSURANCE

A. Source Limitations: For products listed together in the same articles in Part 2, provide products of same manufacturer unless otherwise approved by Architect.

1.5 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

PART 2 - PRODUCTS

2.1 BASIS OF DESIGN

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. American Specialties, Inc.
2. Bobrick Washroom Equipment, Inc.
4. Koala Kare
5. Safety Craft
6. Rubbermaid
7. Georgia Pacific
8. Kohler

B. Basis for Design:
1. Toilet Room Accessories: Refer to toilet accessory schedule indicated in drawings.
2. Baby Changing Station: Koala Kare
3. Products meeting all characteristics and specifications of basis design shall be acceptable.

2.2 MATERIALS
A. Stainless Steel: ASTM A 666, Type 304, 0.0312-inch minimum nominal thickness, unless otherwise indicated.

B. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.0359-inch (0.9-mm) minimum nominal thickness.


D. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper and-theft resistant where exposed, and of galvanized steel where concealed.

2.3 PRODUCTS

A. Toilet Room Accessories:
   1. Toilet tissue dispenser
   2. Sanitary napkin disposal
   3. Grab bar
   4. Clothes hook
   5. Soap dispenser
   6. Paper towel dispenser
   7. Countertop chute
   8. Toilet cover dispenser
   9. Frameless glass mirror
      a. Glass Mirrors, General: ASTM C 1503; manufactured using copper-free, low-lead mirror coating process.
      b. Mirror Edge Treatment: Flat polished edge.
      c. Thickness: ¼”.
      d. Protect mirror glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
      e. Protect mirror glass from damage immediately after installation by attaching crossed streamers. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
      f. Protect mirror glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with mirror glass, remove substances immediately as recommended by glass manufacturer.

B. Baby Changing Station
1. Baby changing station body shall be durable, injection-molded polypropylene.
2. Design of unit shall be surface-mounted.
3. Unit shall be equipped with a pneumatic cylinder for controlled opening and closing of bed.
4. Bed shall be secured to metal mounting chassis with a concealed steel-on-steel hinge.
5. No hinge structure shall be exposed on interior or exterior surfaces.
6. Unit shall have all mounting hardware included.
7. Unit shall have Microban® antimicrobial embedded into plastic material on the changing surface.
8. Unit shall comply with ADA regulations when installed in accordance with ADA and MAAB requirements.
9. Bed shall have smooth concave changing area with a nylon safety strap and two hooks for bags or purses.
10. Unit shall have a built-in Liner Dispenser for use with 3-ply chemical free biodegradable bed liners, instructional graphics and safety messages in 4 languages and Braille label.
11. Unit shall have a manufacturer’s 5-year limited warranty on materials and workmanship and include a provision for replacement caused by vandalism.

2.4 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying.

C. Provide minimum of six keys to the Owner.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lb/ft, when tested according to method in ASTM F 446.
3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION
PART 1 GENERAL

1.1 GENERAL PROVISIONS

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

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
   1. Fire department key vault box.
   2. Fire department Plan and Document Vault Box

B. Related Work: The following items are not included in this Section and are specified under the designated Sections:
   1. Section 06 10 00 - ROUGH CARPENTRY; Wood blocking.
   2. Section 09 21 16 - GYPSUM BOARD ASSEMBLIES

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's product data, installation instructions, use limitations and recommendations for each product and system used. Provide manufacturer's certifications stating that products and systems comply with requirements.

B. Shop Drawings: Provide large scale shop drawings for fabrication, installation and erection of all parts of the work. Provide plans, elevations, and details of anchorage, connections and accessory items. Provide installation templates for work installed by others.

C. Construction Manager and Installing Sub-Contractor’s Review: Before commencing work, submit signed statement that Contract Documents have been reviewed by both the Construction Manager and Installing Sub-Contractor with a qualified representative of supplier/manufacturer, and that selected materials and construction are proper, compatible, and adequate for application shown.
PART 2 PRODUCTS

2.1 FIRE DEPARTMENT KNOX BOX KEY (VAULT) CABINET

A. Provide Knox Box Key (Vault) Cabinet at building entrance; location shall be acceptable to local Fire Department.
   1. Basis of Design: Model 3200 Knox-Box, Recessed Mounted Type, by Knox Company, Phoenix, AZ 85027; www.knoxbox.com
      a. Finish: Weather resistant TGIC polyester powder coat, color as selected by Architect from manufacturer’s standard colors.
      b. Locking: Provide lock and keys acceptable to local Fire Department.
      c. Building Alarm Interface: Provide tamper switch interface with building alarm system.
      d. Accessories:
         i. Provide manufacturer’s standard recessed mounting kit, for installation in specified construction.
         ii. Provide alarm tamper switches, UL listed.

B. Provide Knox Box Document Storage Cabinet
      a. Finish: Weather resistant TGIC polyester powder coat, color as selected by Architect from manufacturer’s standard colors.
      b. Locking: Provide lock and keys acceptable to local Fire Department.
      c. Building Alarm Interface: Provide tamper switch interface with building alarm system.
      d. Accessories:
         i. Provide manufacturer’s standard recessed mounting kit, for installation in specified construction.
         ii. Provide alarm tamper switches, UL listed.

PART 3 - EXECUTION

3.1 COORDINATION WITH FIRE DEPARTMENT

A. Coordinate final location for Key vault and Plan Cabinet with Fire Department.

B. Unless specifically directed by Fire department, provide both Key Vault and Plan cabinet immediately adjacent to each other.
3.2 INSPECTION

A. Rough-In Work: Examine installation of walls and other conditions under which work is to be installed; verify dimensions of services and substrates before fabricating work.

B. Notify Contractor of unsatisfactory locations and dimensions of other work and of unsatisfactory conditions for proper installation of equipment. Do not proceed with fabrication and installation until unsatisfactory dimensions and conditions have been corrected in manner satisfactory to Installer.

3.3 FIRE DEPARTMENT KNOX BOX INSTALLATION

A. General: Set each item of equipment securely in place, level, and adjust to correct height (4 ft.- 0 in. AFF).

B. Anchor to supporting substrate where indicated and where required for sustained operation and use without shifting or dislocation. Conceal anchorage where possible. Seal perimeter joints in accordance with Section 07 92 00 - JOINT SEALANTS.

3.4 CLEANING

A. After completion of installation and other major work remove protective coverings, if any, and clean equipment, internally and externally. Restore exposed and semi-exposed finishes to remove abrasions and other damages; polish exposed-metal surfaces and touch-up painted surfaces. Replace work that cannot be successfully restored.

END OF SECTION
PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
   1. Portable fire extinguishers (provide 6)
   2. Fire-protection cabinets for portable fire extinguishers (provide 6)

B. Related Work: The following items are not included in this Section and are specified under the designated Sections:
   1. Section 09 90 00 - PAINTING AND COATING for field painting fire-protection cabinets.

1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each item.
   1. Fire Extinguishers: Include rating and classification.
   2. Fire-Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.

B. Maintenance Data: For fire extinguishers and fire-protection cabinets to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain fire extinguishers and fire-protection cabinets through one source from a single manufacturer.

B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

C. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
D. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements of ASTM E 814 for fire-resistance rating of walls where they are installed.

1.5 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

PART 2 - PRODUCTS

2.1 PORTABLE FIRE EXTINGUISHERS

A. General: Provide fire extinguishers of type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.

B. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 2-A:10-B:C, 5-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

2.2 FIRE-PROTECTION CABINET

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. JL Industries, Inc.
   2. Larsen's Manufacturing Company.
   3. Potter Roemer; Div. of Smith Industries, Inc.

B. Cabinet Type: Suitable for fire extinguisher.


D. Recessed Cabinet: Cabinet box recessed in walls of sufficient depth to suit style of trim indicated.
   1. Trimless with Plaster Stop: Surface of surrounding wall finishes flush with exterior finished surface of cabinet frame and door, without overlapping trim attached to cabinet. Provide recessed flange, of same material as box, attached to box to act as plaster stop. If wall condition does not allow for trimless with plaster stop, provide flat 5/16 inch trim of same material as the cabinet box.

E. Semi-recessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
   1. Square-Edge Trim: 1-1/4- to 1-1/2-inch backbend depth.
F. Door Material: Steel sheet with baked enamel finish, color as selected.

G. Door Style: Vertical duo panel with frame.

H. Door Glazing: Tempered break glass.

I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

J. Accessories:
   1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
   2. Break-Glass Strike: Manufacturer's standard metal strike, complete with chain and mounting clip, secured to cabinet, or provide locking mechanism that allows for emergency access to the cabinet without the breaking of glass, simply by pulling sharply on the cabinet’s handle.
   3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

2.3 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
   1. Weld joints and grind smooth.
   2. Construct fire-rated cabinets with double walls fabricated from 0.0428-inch-thick, cold-rolled steel sheet lined with minimum 5/8-inch-thick, fire-barrier material.
      a. Provide factory-drilled mounting holes.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
   1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum ½ inch thick.
   2. Miter and weld perimeter door frames.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.
2.4 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire-protection cabinets after assembly.

D. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and partitions for suitable framing depth and blocking where recessed cabinets will be installed.

B. Examine fire extinguishers for proper charging and tagging. Construction Manager shall be responsible for fire extinguisher tagging by a certified service technician located within 75 miles of the project.
   1. Remove and replace damaged, defective, or undercharged units.

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

3.2 PREPARATION

A. Prepare recesses for recessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

A. General: Install fire-protection specialties in locations and at mounting heights indicated on the Drawings and acceptable to authorities having jurisdiction.

B. Fire-Protection Cabinets: Fasten fire-protection cabinets to structure, square and plumb.
1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is not adequate for recessed cabinets, provide semi-recessed fire-protection cabinets.

2. Provide inside latch and lock for break-glass panels.

3. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

C. Identification: Apply vinyl lettering at locations indicated.

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire-protection specialties are installed, unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory finished appearance. Use only materials and procedures recommended or furnished by fire protection cabinet manufacturer.

E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION
SECTION 11 30 00

RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 DESCRIPTION OF WORK

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

1. Appliances.

B. Related Work: The following items are not included in this Section and are specified under the designated Sections:

1. Section 12 35 30 - RESIDENTIAL CASEWORK
2. Section 22 00 00 - PLUMBING for water distribution piping connections, drainage and vent piping connections, sinks, and waste disposers.
3. Section 26 00 00 - ELECTRICAL for services and connections to appliances.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include operating characteristics, dimensions of individual appliances, and finishes for each appliance.

B. Appliance Schedule: For appliances; use same designations indicated on Drawings.

C. Maintenance Data: For each product to include in maintenance manuals.

D. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer for installation and maintenance of units required for this Project.

B. Source Limitations: Provide products from same manufacturer for each type of appliance required.

C. Regulatory Requirements: Comply with provisions of the following product certifications:

1. NFPA: Provide electrical appliances listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. UL and NEMA: Provide electrical components required as part of residential appliances that are listed and labeled by UL and that comply with applicable NEMA standards.
3. ANSI: Provide gas-burning appliances that comply with ANSI Z21 Series standards.

D. Regulatory Requirements, Accessibility: Where residential appliances are indicated to comply with accessibility requirements, comply with Massachusetts Architectural Access Board requirements and the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

E. Energy Ratings: Provide residential appliances that carry labels indicating energy-cost analysis (estimated annual operating costs) and efficiency information as required by the FTC Appliance Labeling Rule.

F. Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.

G. Switches: Provide mercury-free switches in appliances.

H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01.

1.5 WARRANTY

A. Special Warranties: Manufacturer's standard form in which manufacturer of each appliance specified agrees to repair or replace residential appliances or components that fail in materials or workmanship within manufacturer's standard warranty period.

PART 2 - PRODUCTS

2.1 APPLIANCES

A. Appliance Schedule:

1. Wall Oven:
   a. New 30-in electric wall ovens at Community Room Kitchen:
      i. Basis of Design: GE 30” Built-in Single Convection Wall Oven
      ii. Model#: JT5000SFSS
      iii. Dimensions: 29 ¾-in (w) x 28 5/8-in (h) x 23 ½-in (d)

2. Cooktop:
   a. New 36” cooktop at new Community Building kitchen.
      i. Basis of Design: GE Profile Series 36” Built-in Touch Control Cooktop
      ii. Model: PP9036SJSS
      iii. Dimensions: 36 1/8in x 5 5/16in x 20 ½ in
      iv. Color: Stainless Steel on black
      v. Frame Color/ Material: Stainless Steel
3. Refrigerator:
   a. New stainless-steel front 22.1 Cu. Ft. Side-by-Side Refrigerator at eight (8) accessible units
   b. Basis of Design: Frigidaire FFHS2322MS
      i. Dimensions: 33" W x 32" D x 69-7/8" H
      ii. Provide seven (7) new refrigerators at accessible units
      iii. Provide one (1) new refrigerator at new Community Building kitchen.

4. Vent Hood:
   a. New stainless steel 36" vent hood at Community Building kitchen
      i. Basis of Design: Frigidaire 36" Overhead Range Hood
      ii. Model: FHWC3625MS
      iii. 36" W x 18-5/8" D x 5" H

PART 3 - EXECUTION

3.1 EXAMINATION

   A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
   
   B. Examine roughing-in for piping systems to verify actual locations of piping connections before equipment installation.
   
   C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

   A. General: Comply with manufacturer's written instructions.
   
   B. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and rough openings are completely concealed.
   
   C. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.
   
   D. Utilities: Refer to Division 22 - PLUMBING for plumbing requirements and Division 26 - ELECTRICAL for electrical requirements.

3.3 CLEANING AND PROTECTION

   A. Test each item to verify proper operation. Make necessary adjustments.
   
   B. Verify that accessories required have been furnished and installed.
C. Remove packing material from appliances and leave units in clean condition, ready for operation.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train the Owner’s maintenance personnel to adjust, operate, and maintain appliances.

END OF SECTION
PART 1 GENERAL

GENERAL PROVISIONS

1.1 GENERAL PROVISIONS

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

1.2 SECTION INCLUDES

A. Sunscreen roller shades for installation at all Building 9 first floor exterior windows along Ash Street and Hillman Street facades up to and including window in Stair Lobby 133.

1.3 RELATED SECTIONS

A. Section 06 10 00 - Rough Carpentry: Wood blocking and grounds for mounting roller shades and accessories.

B. Section 09 21 16 - Gypsum Board Assemblies: Coordination with gypsum board assemblies for installation of shade pockets, closures and related accessories.

C. Section 09 51 00 - Acoustical Ceilings: Coordination with acoustical ceiling systems for installation of shade pockets, closures and related accessories.

1.4 REFERENCES


B. NFPA 701 - Fire Tests for Flame-Resistant Textiles and Films.

1.5 SUBMITTALS

A. Submit under provisions of Section 01 30 00.

B. Manufacturer’s data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
   3. Storage and handling requirements and recommendations.
   4. Mounting details and installation methods.

C. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.
   1. Prepare shop drawings on Autocad or Microstation format using base sheets.
provided electronically by the Architect.

D. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.

E. Selection Samples: For each finish product specified, one set of shade cloth options and aluminum finish color samples representing manufacturer’s full range of available colors and patterns.

F. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Shadecloth sample and aluminum finish sample as selected. Mark face of material to indicate interior faces.

G. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years experience in manufacturing products comparable to those specified in this section.

B. Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section.

C. Fire-Test-Response Characteristics: Passes NFPA 701 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.

D. Electrical Components: NFPA Article 100 listed and labeled by either UL or ETL or other testing agency acceptable to authorities having jurisdiction, marked for intended use, and tested as a system. Individual testing of components will not be acceptable in lieu of system testing.

E. Anti-Microbial Characteristics: ‘No Growth’ per ASTM G 21 results for fungi ATCC9642, ATCC 9644, ATCC9645.

F. Mock-Up: Provide a mock-up (manual shades only) of one roller shade assembly for evaluation of mounting, appearance and accessories.
   1. Locate mock-up in window designated by Architect.
   2. Do not proceed with remaining work until, mock-up is accepted by Architect.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the Window Treatment Schedule.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels
1.9 WARRANTY

A. Roller Shade Hardware and Chain Warranty: Manufacturer's standard non-depreciating twenty-five year limited warranty.

B. Standard Shadecloth: Manufacturer's standard twenty-five year warranty.

C. Roller Shade Installation: One year from date of Substantial Completion, not including scaffolding, lifts or other means to reach inaccessible areas.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Mecho, Inc., which is located at: 42-03 35th St.; Long Island City, NY 11101; Tel: 718-729-2020; Fax: 718-729-2941; Email: angela.gratereaux@mechoshade.com; Web: www.mechoshade.com

B. Other acceptable Manufacturers:
   1. Draper
   2. Hunter Douglas

C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00.

2.2 ROLLER SHADE TYPE AND SHADECLOTH

A. Manually Operated Shades:
   1. Mounting: Surface mounted with fascia.
   3. Solar Shadecloths:
      a. Submit full line of standard shadecloths for selection by Architect

2.3 SHADE BAND

A. Shade Bands: Construction of shade band includes the fabric, the hem weight, hem-pocket, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hem pockets are not acceptable.
   1. Hem Pockets and Hem Weights: Fabric hem pocket with RF-welded seams (including welded ends) and concealed hem weights. Hem weights shall be of appropriate size and weight for shade band. Hem weight shall be continuous inside a sealed hem pocket. Hem pocket construction and hem weights shall be similar, for all shades within one room.
   2. Shade Band and Shade Roller Attachment:
      a. Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection. Roller tubes less than 1.55 inch (39.37 mm) in diameter for manual shades, and less than 2.55 inches (64.77 mm) for motorize shades are not acceptable.
      b. Provide for positive mechanical engagement with drive / brake mechanism.
c. Provide for positive mechanical attachment of shade band to roller tube; shade band shall be made removable / replaceable with a "snap-on" "snap-off" spline mounting, without having to remove shade roller from shade brackets.
d. Mounting spline shall not require use of adhesives, adhesive tapes, staples, and/or rivets.
e. Any method of attaching shade band to roller tube that requires the use of: adhesive, adhesive tapes, staples, and/or rivets are not acceptable.

2.4 SHADE FABRICATION

A. Fabricate units to completely fill existing openings from head to sill and jamb-to-jamb, unless specifically indicated otherwise.

B. Fabricate shadecloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shadecloth to roll true and straight without shifting sideways more than 1/8 inch (3.18 mm) in either direction per 8 feet (2438 mm) of shade height due to warp distortion or weave design. Fabricate hem as follows:

C. Provide battens in standard shades as required to assure proper tracking and uniform rolling of the shadecloths. Contractor shall be responsible for assuring the width-to-height (W:H) ratios shall not exceed manufacturer's standards or, in absence of such standards, shall be responsible for establishing appropriate standards to assure proper tracking and rolling of the shadecloth within specified standards. Battens shall be roll-formed stainless steel or tempered steel, as required.

D. For railroaded shadecloths, provide seams in railroaded multi-width shadecloths as required to meet size requirements and in accordance with seam alignment as acceptable to Architect. Seams shall be properly located. Furnish battens in place of plain seams when the width, height, or weight of the shade exceeds manufacturer's standards. In absence of such standards, assure proper use of seams or battens as required to, and assure the proper tracking of the railroaded multi-width shadecloths.

E. Provide battens for railroaded shades when width-to-height (W:H) ratios meet or exceed manufacturer's standards. In absence of manufacturer's standards, be responsible for proper use and placement of battens to assure proper tracking and roll of shadecloths.

2.5 COMPONENTS

A. Access and Material Requirements:
   1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.
   2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.
   3. Use only Delrin engineered plastics by DuPont for all plastic components of shade hardware. Styrene based plastics, and/or polyester, or reinforced polyester will not be acceptable.
B. Manual Operated Chain Drive Hardware and Brackets:

1. Provide for universal, regular and offset drive capacity, allowing drive chain to fall at front, rear or non-offset for all shade drive end brackets. Universal offset shall be adjustable for future change.

2. Provide hardware capable for installation of a removable fascia, for both regular and/or reverse roll, which shall be installed without exposed fastening devices of any kind.

3. Provide shade hardware system that allows for removable regular and/or reverse roll fascias to be mounted continuously across two or more shade bands without requiring exposed fasteners of any kind.

4. Provide shade hardware system that allows for operation of multiple shade bands (multi-banded shades) by a single chain operator, subject to manufacturer’s design criteria. Connectors shall be offset to assure alignment from the first to the last shade band.

5. Provide shade hardware system that allows multi-banded manually operated shades to be capable of smooth operation when the axis is offset a maximum of 6 degrees on each side of the plane perpendicular to the radial line of the curve, for a 12 degrees total offset.

6. Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connectors for drive mechanism connection to shade roller tube are not acceptable.

7. Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel or heavier as required to support 150 percent of the full weight of each shade.

8. Drive Bracket / Brake Assembly:
   a. MechoShade Drive Bracket model M5 shall be fully integrated with all Mecho (formerly MechoShade) accessories, including, but not limited to: SnapLoc fascia, room darkening side / sill channels, center supports and connectors for multi-banded shades.
   b. M5 drive sprocket and brake assembly shall rotate and be supported on a welded 3/8 inch (9.525 mm) steel pin.
   c. The brake shall be an over-running clutch design which disengages to 90 percent during the raising and lowering of a shade. The brake shall withstand a pull force of 50 lbs. (22 kg) in the stopped position.
   d. The braking mechanism shall be applied to an oil-impregnated hub on to which the brake system is mounted. The oil impregnated hub design includes an articulated brake assembly, which assures a smooth, non-jerky operation in raising and lowering the shades. The assembly shall be permanently lubricated. Products that require externally applied lubrication and or not permanently lubricated are not acceptable.
   e. The entire M5 assembly shall be fully mounted on the steel support bracket, and fully independent of the shade tube assembly, which may be removed and reinstalled without effecting the roller shade limit adjustments.
   f. Drive Chain: #10 qualified stainless steel chain rated to 90 lb. (41 kg) minimum breaking strength. Nickel plate chain shall not be accepted.
2.6 ACCESSORIES

A. Fascia:
   1. Continuous removable extruded aluminum fascia that attaches to shade mounting brackets without the use of adhesives, magnetic strips, or exposed fasteners.
   2. Fascia shall be able to be installed across two or more shade bands in one piece.
   3. Fascia shall fully conceal brackets, shade roller and fabric on the tube.
   4. Provide bracket / fascia end caps where mounting conditions expose outside of roller shade brackets.
   5. Notching of Fascia for manual chain shall not be acceptable.

PART 3 EXECUTION

3.1 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.

3.2 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.

3.3 INSTALLATION

A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2 inches (50 mm) to interior face of glass. Allow proper clearances for window operation hardware.
B. Clean roller shade surfaces after installation, according to manufacturer's written instructions.
C. Engage Installer to train Owner’s maintenance personnel to adjust, operate and maintain roller shade systems.

3.4 PROTECTION

A. Protect installed products until completion of project.
B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION
SECTION 12 35 30
CASEWORK

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 DESCRIPTION OF WORK

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

   A. Kitchen Cabinetry:
      1. Door Style: Wood (Species and style as noted below)
      2. Cabinet Body: Plywood Series.

   B. Kitchen Countertops:
      1. Post-formed High Pressure Decorative Laminate
      2. Solid Surface

   C. Women’s and Men’s Vanity Countertops
      1. Solid Surface vanity countertop

   D. Specialty Casework:
      1. Radiator Enclosures

B. Related Work: The following items are not included in this Section and are specified under the designated Sections:

   1. Section 06 10 00 – ROUGH CARPENTRY
   2. Section 06 20 00 – FINISH CARPENTRY
   3. Section 09 21 16 – GYPSUM WALLBOARD ASSEMBLIES
   4. Section 09 65 00 – RESILIENT FLOORING
   5. Section 11 30 13 - RESIDENTIAL APPLIANCES
   6. Section 22 00 00 – PLUMBING
   7. Section 23 00 00 - HVAC
   8. Section 26 00 00 – ELECTRICAL

1.3 REFERENCES

A. ANSI/KCMA A161.1 2000 Performance & Construction Stds. For Kitchen Cabinets- the
industry recognized standard for residential cabinet construction.

B. HUD – Severe Use Specifications for Public and Indian Housing – Sept. 1993

C. AWI – American Woodwork Institute- materials and finish grades

D. ANSI161.2 1979 Performance Standards for High Pressure Decorative Laminate Countertops

E. NSF/ANSI 51 Performance Std. For Solid Surface Products in Food Service

F. UL 723,(ASTM E84) Fire Resistance Ratings for Solid Surface Materials

G. Massachusetts DDS Design Guidelines (for Special Needs Housing)

1.4 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Shop Drawings: Indicate type, location, size, and hand of each component. Include requirements for blocking and relationship with adjacent construction.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors.

E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square representing actual product, color, and patterns.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum ten years experience manufacturing similar products.

B. Installer Qualifications: Minimum two years experience installing similar products.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Finish areas designated by Architect.
   2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
   3. Remodel mock-up area as required to produce acceptable work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer’s unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.
1.7 PROJECT CONDITIONS

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

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Wood Cabinetry:
   1. Advanta Cabinets - Basis of Design
   2. Echelon Cabinetry
   3. Kraftmaid Cabinets

B. Acceptable Manufacturer: Post-formed High Pressure Decorative Laminate
   1. Pionite
   2. Formica
   3. Wilsonart

C. Acceptable Manufacturer: Solid Surface
   1. DuPont (Corian) - Basis of Design
   2. Avonite
   3. Staron

D. Vanity tops with Integral Sinks - Basis of Design
   1. Transolid
      a. Division of Trumbull Industries, Inc.
      b. (800) 766-2452
      c. 400 Dietz Road, Warren, OH 44483

2.2 WOOD CABINETRY MATERIALS

A. Exposed face and door materials to consist of the following selections: Birch

B. Plywood: plywood core with Birch facings where exposed.

C. Hardware:
   1. Door knobs / pulls: To be chosen from manufacturer's full range of selections.
   2. Drawer knobs / pulls: To be chosen from manufacturer's full range of selections.

D. Drawer glides:
   2. Door hinges: To be chosen from manufacturer's select range of selections.

2.3 WOOD DOOR STYLES

A. Wood Door Style (per Basis of Design Advanta Cabinets):
   1. Siena 5-PC Birch - ¾" thick solid birch door frames and drawer fronts / Genuine birch wood veneer recessed flat panel in frame / Assembled with five-piece mortise and
tenon joinery / Available in square design for all cabinets; offered with 5-Piece drawer fronts / Standard reveal doors

2. Color: Toffee

2.4 FABRICATION

A. Fabricate casework in accordance with ANSI/ KC MA 161. 1.

B. Fabricate casework utilizing following fabrication requirements for wall, base, tall, and vanity cabinets. Specialty cabinets may vary from specified requirement s, using

C. manufacturer's standard fabrication process.

D. Shop assemble cabinet in units of sizes and configurations indicated.

E. Fabricate corners and joints without gaps and in accessible spaces.

F. Fabricate each unit to be rigid, not dependent on adjacent units for stability.

G. Attach corner braces to cabinet corners to ensure cabinet squareness.

2.5 COMPONENTS

A. Extreme Construction Series


2. End Panels - Standard: Nominal 1/2" (12mm) thick, multi-ply Type I exterior glue hardwood plywood, dadoed to receive tops and bottoms. End s are inserted into dado in face frame and recessed 3/16" and rabbeted to receive backs Upgrade: Nominal 1/2" (12mm) thick, multi-ply hardwood plywood with oak veneer on exterior surface and birch veneer on interior surface. All end panels are constructed with the same joinery as noted above.

3. Top/Bottom Panels - Nominal 1/2" (12mm) thick multi-ply hardwood plywood. Tops and bottoms let into end panels, front rails and hang rails, glued and stapled. Bottoms are supported at rear of base cabinets by nominal 1/2" thick multi-ply hardwood plywood.

4. Hanging Rails - Wall cabinets have nominal 3/4" (18mm) thick x 3" high multi-ply hardwood plywood, running full cabinet length at the top and bottom. Base cabinets have nominal 3/4" (18mm) thick x 7 1/4" high solid pine at the top. All hang rails are rabbeted to inset in end panels and to receive backs.

5. Back Panel - Nominal 1/4" (6mm) thick, hardwood plywood. Securely glued and stapled to rabbets in end panels and hang rail s.

6. Shelves - Nominal 1/2" (12mm) thick multi-ply hardwood plywood, 10 7/8" deep with hardwood veneer banded front edge. Shelves are fixed into dadoes in end panels on all cabinets.

7. Toe Kick - Toe kick is 4" high and recessed 4". Standard: Nominal 3/4" (18mm) thick,
3-sided ACQ* pressure treated toe board attached inside end panels.

9. **Base Corner Braces** - Two ½” thick (12mm) x 2 7/8” wide plywood braces running full depth front to back of cabin et, recessed down ½” from top. All braces are glued and stapled at top of cabinet to front frame and hang rail, and dadoed into end panel.

10. **Drawer Boxes** - Standard: Nominal 5/8” (16mm) Solid hardwood with dovetail construction. Drawer bottom s are nominal ¼” plywood inserted into dado in front, back, and sides. Drawer bottoms are glued and stapled into sides.


12. **Hinges** - refer to architect / owner selection at section 2 Materials item f section IV.

13. **Finish** - Furniture quality protective finish system on doors, drawer fronts, front frames and veneer plywood end panels consisting of sanding, stain, catalyzed sealer, and catalyzed clear top coats.

2.6 INSTALLATION

A. Set & secure casework in place; rigid, plumb, & level no more than ¼” every 8’

B. Use concealed joint fasteners to align & secure adjoining cabinets.

C. Carefully scribe & miter trims, apply with pin nails, fill holes.

D. Carefully scribe casework abutting to other fixed components (i.e. wall) with maximum gaps of 1/32 inches.

E. Install pulls & knobs if required in alignment with each other.

F. Carefully adjust doors for alignment.

G. Carefully adjust drawers & slide out trays for alignment and smooth

2.7 HIGH-PRESSURE DECORATIVE LAMINATE COUNTERTOPS (Kitchen 111)

A. Acceptable plastic laminate manufacturers:
   1. Pionite
   2. Formica
   3. Wilsonart

B. Performance Requirements: Meet performance requirements of the following, unless otherwise specified:
   1. ANSI/KCMA A161.2.
   2. AWI/AWMAC/WI Architectural Woodwork Standards, Section 11 – Countertops.
   3. GREENGUARD Indoor Air Quality Certified.
   4. CARB Phase II.

C. Types:
   1. Postformed countertops with integral backsplashes.
   3. Postforming (HGP); WA Type 350

D. Pattern & Color:
E. Substrates:
1. MDF:
   a. Description: 100 percent pre-consumer recycled wood fiber with no added urea formaldehyde, industrial grade.
   b. Conformance: ANSI A208.2.
   c. FSC certified.
   d. Thickness: 3/4 inch.

2. Plywood:
   a. No added urea formaldehyde.
   b. FSC certified.
   c. Thickness: 3/4 inch.

F. Adhesives: Water-based polyvinyl acetate (PVA).

G. Backing Sheets:
2. Type: Phenolic backer.
3. Thickness: 0.020 inch, plus or minus 0.005 inch.

2.8 SOLID SURFACE VANITY COUNTERTOPS (at Women's 119 and Men's 118 Restrooms)

A. Unit Vanities:
1. Grade: Custom.

2. Colors, Patterns, and Finishes: Provide materials and products that result in colors of solid-surfacing material complying with the following requirements:
   a. As indicated on Finish Schedule.

3. Fabricate tops in one piece, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.

4. Fabricate tops with shop-applied edges of materials and configuration indicated.

5. Fabricate tops with loose backsplashes for field application.

6. Provide cutouts for undermount sinks per templates provided by sink manufacturer.

7. Drill holes in countertops for plumbing fittings and soap dispensers in shop.

2.9 RADIATOR ENCLOSURES (new enclosures at existing vertical, multi-section steam radiators)

A. Construction:
1. Basis of Design: Ambassador Radiator Cover by ARSCO Manufacturing, Cincinnati, OH
2. Custom steel radiator enclosures to be fabricated of 16 gauge steel body and top.
3. Grille Design: 20 gauge metal from manufacturer’s available design options
4. Finish: baked enamel; Color: to be selected from manufacturer’s available color chart.
5. Acceptable manufacturers include:
   a. ARSCO Manufacturing, Cincinnati, OH
   b. Barker Metalcraft, Chicago, IL
   c. AAA Radiator Enclosures, Melrose, MA
6. Size: Field measure and fabricate per field-verified conditions.

PART 3 EXECUTION

3.1 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.
   C. Examine surfaces to receive countertops.
   D. Notify Architect of conditions that would adversely affect installation or subsequent use.

3.2 PREPARATION
   A. Clean surfaces thoroughly prior to installation.
   B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
   C. Verify casework and supports are plumb, level, square, and secure before installation of countertops.
   D. Inspect countertops before installation to determine they are sound and free from defects and damage.

3.3 INSTALLATION
   A. Install in accordance with manufacturer’s instructions.
   B. Install countertops in accordance with manufacturer’s instructions and AWI/AWMAC/WI Architectural Woodwork Standards, Section 11 – Countertops.
   C. Install countertops at locations indicated on the Drawings.
   D. Install countertops level, plumb, and square.
   E. Securely anchor countertops to casework and supports.
F. Install joints to be watertight.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

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PART 1 - GENERAL

1.1 FILED SUB-BID REQUIRED

A. Time, Manner and Requirements for Submitting Sub-Bids:

1. Sub-bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the Public Agency at a time and place as stipulated in the “Instructions to Bidders.”

2. Each sub-bid submitted for work under this Section shall be on forms furnished by the Awarding Authority as required by Section 44F of Chapter 149 of the General Laws, as amended.

3. Sub-bids filed with the Awarding Authority shall be accompanied by Bid Bond, Cash, Certified Check, Treasurer’s Check, or Cashier’s Check issued by a responsible bank or trust company payable to the City of New Bedford in the amount of 5 percent of the sub-bid. A sub-bid accompanied by any other form of bid deposit than those specified will be rejected.

4. The Filed Sub-Bidder for the work of this SECTION 22 00 00 shall list, in Paragraph E, of the FORM FOR SUB-BID, the name of each person, firm, or corporation, whom he proposes to use to perform the following classes of work or part thereof, at the bid price therefore:

B. The Filed Sub-Bidder for the work of this SECTION 220000 shall list, in Paragraph E, of the FORM FOR SUB-BID, the name of each person, firm, or corporation, whom he proposes to use to perform the following classes of work or part thereof, at the bid price therefore:

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If Sub-Bidder intends to perform with persons of his own staff the classes of work listed above, he must nevertheless list his own name therefore, under Paragraph E, of the FORM FOR SUB-BID.

C. The Work of this Section is shown on the following Drawings: P0.01, P1.00, P1.01, P1.02, VS.1 and VS.2.

D. The Trade Contractor shall also examine all other Drawings and all other Sections of the Specifications for requirements therein affecting the Work of this Section, not just those pertaining to this Sub-trade.
1.2 GENERAL PROVISIONS

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

1.3 DESCRIPTION OF WORK

A. Provide all labor, materials, equipment, services and accessories necessary to furnish and install the work of this Section, complete and functional, as indicated in the Contract Documents and as specified herein.

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 Plumbing Work.

C. Without limiting the generality thereof, the work to be performed under this Section includes:
   1. Complete Sanitary, Waste & Vent System as shown on the drawings.
   2. Potable Cold and Hot Water System.
   3. Natural gas system.
   4. Insulation.
   5. Potable Water Heating Equipment.
   6. Fixtures and Equipment
   7. Connection to Equipment Furnished by Others
   8. Flushing, Sterilization, and Tests
   9. Furnishing of Access Panels
   10. Drilling, Coring and Cutting & Patching of holes and openings where the largest dimension thereof does not exceed 12 inches for Plumbing Piping and Equipment.
   11. Demolition of existing Plumbing Equipment and Disconnecting, Capping, and otherwise making inactive, all existing Plumbing Services in the various areas where Demolition and Removal Work is required; and removing, relocating, and reinstalling existing Plumbing items to the extent specifically noted in the documents. Remove all piping hangers and equipment in accordance with the description in paragraph 1.20.
   12. Provide and maintain temporary water service as directed by General Contractor. General Contractor to pay for all water use.
   13. Scaffolding, Rigging, and Staging required for all Plumbing Work. Comply with Division 1 requirements.
   14. Provide Seismic Restraints for all Plumbing Systems conforming to the requirements of Section 230548 which Section is herein incorporated by reference. Seismic restraints are required on all new plumbing systems.
   15. Preparation of Co-ordination Drawings.
16. Smoke and Firestopping Seals and sealing of all wall penetrations as detailed on the drawings. Refer to Section 078410 which defines the firestopping materials and methods.

17. When open-flame or spark producing tools such as blower torches, welding equipment, and the like are required in the process of executing the work, the General Contractor shall be notified not less than twenty four hours in advance of the time that the work is to begin and the location where work is to be performed. Provide fire protective covering and maintain constant non-working fire watch, paying all fees, where work is being performed and until it is completed. Fee for fire watch shall be included in the bid.

1.4 RELATED WORK

A. The following Related Work will be performed under the designated Sections:

1. Cutting and Patching beyond 1.3C.10 above: SECTION 017329 - CUTTING AND PATCHING
2. Electric Power Wiring: SECTION 260000 - ELECTRICAL
3. HVAC Equipment: SECTION 230000 - HVAC
4. Finish Painting: SECTION 099000 – PAINTING AND COATING
5. Installation of Access Panels: SECTION describing material in which panel is installed.
6. Toilet Room Accessories: SECTION 102800 - TOILET ACCESSORIES
7. Temporary Facilities: SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

1.5 CODES, ORDINANCES, AND PERMITS

A. Perform all work in accordance with the requirements of the City of New Bedford Building Department, Massachusetts State Plumbing and Fuel Gas Codes, D.E.P., A.D.A., NFPA, The Architectural Barrier Code, and applicable State and Federal Laws. Give all requisite notices, file all requisite plans, and obtain all permits required to perform all Plumbing Work. Where the Contract Documents indicate more stringent requirements than the above Codes and Ordinances, the Contract Documents shall take precedence.

B. Obtain all permits, inspections, and approvals, from the governing authorities and pay all fees and include cost in the bid, including approvals for the cross connection control device. Provide the Owner with the cross connection permit for the device in the Owner's name.

C. Owner will pay all related Gas Utility Company back charges.
1.6 DISCREPANCIES IN DOCUMENTS

A. Where Drawings or Specifications conflict or are unclear, advise Designer in writing before Award of Contract. Otherwise, Designer’s interpretation of Contract Documents shall be final, and no additional compensation shall be permitted due to discrepancies or unclarities thus resolved.

B. Where Drawings or Specifications do not coincide with manufacturers’ recommendations, or with applicable codes and standards, alert Designer in writing before installation. Otherwise, make changes in installed work as Designer requires within Contract Price.

C. If the required material, installation, or work can be interpreted differently from drawing to drawing, or between drawings and specs, this contractor shall provide that material, installation, or work which is of the higher standard.

D. It is the intent of these contract documents to have the contractor provide systems and components that are fully complete and operational and fully suitable for the intended use. There may be situations in the documents where insufficient information exists to precisely describe a certain component or subsystem, or the routing of a component. In cases such as this, where the contractor has failed to notify the Designer of the situation in accordance with the paragraph above, the contractor shall provide the specific component or subsystem with all parts necessary for the intended use, fully complete and operational, and installed in workmanlike manner either concealed or exposed per the design intent.

E. In cases covered by the paragraph above, where the contractor believes he needs engineering guidance, he shall submit a sketch identifying his proposed solution and the Designer shall review, note if necessary, and approve the sketch.

1.7 MODIFICATIONS IN LAYOUT

A. HVAC, Plumbing, Fire Protection, and Electrical Drawings are diagrammatic. They indicate general arrangements of mechanical and electrical systems and other work. They do not show all offsets required for coordination nor do they show the exact routings and locations needed to coordinate with structure and other trades and to meet architectural requirements.

B. In all spaces, prior to installation of visible material and equipment, including access panels, review Architectural Drawings for exact locations and where not definitely indicated, request information from Designer.

C. Check Contract Drawings as well as Shop Drawings of all subcontractors to verify and coordinate spaces in which work of this Section will be installed.
D. Maintain maximum headroom at all locations. All piping and associated components to be as tight to underside of structure as possible.

E. Make reasonable modifications in layout and components needed to prevent conflict with work of other trades and to coordinate according to Paragraphs A, B, C, D above. Systems shall be run in a rectilinear fashion.

F. Where conflicts or potential conflicts exist and engineering guidance is desired, submit sketch of proposed resolution to Designer for review and approval.

1.8 SHOP DRAWING AND MATERIAL SCHEDULES

A. Refer to SECTION 013500 – SUBMITTAL PROCEDURES for submittal of Shop Drawings. If apparatus or materials are substituted for those specified, and such substitution necessitates changes in or additional connections, piping, supports or construction, same shall be provided as the responsibility, and at the expense, of the Plumbing Subcontractor.

B. Fabrication of any material or performing of any work prior to the final approval of the Submittals will be entirely at the risk of the Subcontractor. The Subcontractor is responsible for furnishing and installing materials called for in the Contract Documents, even though these materials may have been omitted from approved Submittals.

C. Submit Shop Drawings for the following materials and equipment.
   1. Valves, Piping, couplings and Fittings
   2. Fixtures, Drains and Equipment including Supports
   3. Backflow Preventers
   4. Access Panels and Covers
   5. Insulation
   6. Drains, and Hydro Mechanical Specialties
   7. Hose Bibbs
   8. Hangers, Anchors, Guides, and Supports including Seismic Restraints
   9. Cleanouts
   10. Piping Identification System
   11. Water Heating Equipment

1.9 COORDINATION DRAWINGS

A. Before materials are purchased or Work is begun, prepare and submit to the Architect, Coordination Drawings showing the size and location of all equipment and piping lines relevant to the complete system. Ensure that these Drawings are compatible and correctly annotated and cross-referenced at their interfaces (match lines).
B. Coordination Drawings are for the Contractor’s and the Architect’s use during Construction and shall not be construed as replacing any Shop or Record Drawings required elsewhere in these Contract Documents.

C. Detailed procedures for Coordination Drawings are contained in DIVISION 01 - GENERAL REQUIREMENTS of these Contract Documents.

1.10 RECORD DRAWINGS

A. General: Refer to DIVISION 01 - GENERAL REQUIREMENTS for general requirements for maintaining as-built drawings and submitting final reproducible record documents.

B. The General Contractor will provide two sets of Drawings to the Plumbing Subcontractor, one set of which shall be maintained at the site and which shall, at all times, be accurate, clear, and complete, showing the actual locations of all equipment and piping as it is being installed. The Record Drawings shall be available to the Architect/Engineer’s field representative at all times.

C. Provide electronic AutoCAD drawings to indicate revisions to piping size and location both exterior and interior; including locations of valves and other equipment requiring periodic maintenance or repair; actual equipment locations, dimensioned from column lines; concealed equipment, dimensioned to column line; mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located.

D. Include in the Record Drawings any addenda, sketches, and supplementary Drawings issued during the course of construction.

E. Non-availability of Record Drawings or inaccuracies therein will postpone the final inspection until they are available.

F. All valves shown on these Drawings shall be numbered with numbers corresponding to those on the valve charts.

G. All costs related to the foregoing requirements shall be paid by the Plumbing Subcontractor.

1.11 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS

A. Provide operating instructions to the Owner's designated representative with respect to operation functions and maintenance procedures for all equipment and systems installed. At the completion of the project, turn over to the Architect four (4) complete manuals, in three-ring, loose-leaf binders, containing the following:
   1. Complete Shop Drawings of all equipment.
   2. Operation description for all systems.

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3. Names, addresses, and telephone numbers of all suppliers of the system.
4. Preventative maintenance instructions for all systems.
5. Spare parts lists of all system components.
6. Four copies of video of below slab piping.
7. Valve tag chart.

B. Provide DVD recording of operation and maintenance training sessions and include as part of O & M Manual submittal. Training session video recording and DVDs shall be performed by a professional videographer. Provide indexed table of contents for DVD recording.

1.12 GUARANTEE

A. Refer to Division 1 of the Contract. Guarantee all work under this Section free from defects in workmanship and materials for a period of one (1) year from the date of final acceptance of the building, as set forth in the Contract. Replace any such defective work developing during this period, unless such defects are clearly the result of bad usage of equipment by others. Where such defective work results in damage to work of other Sections of the Specifications, restore such work to its original condition by mechanics skilled in the affected trade.

1.13 DRAWINGS

A. All work shown on the Drawings is intended to be approximately correct to scale, but shall be taken in a sense as diagrammatic. Sizes of pipes and general method of running them are shown, but it is not intended to show every offset and fitting. To carry out the true intent and purpose of the plans, furnish all necessary parts to make complete working systems ready for use. The Plumbing Drawings are intended to show the main stacks and risers and may or may not necessarily show all runout piping particularly in lavatories and gang toilet areas. Contractor shall include all runout piping to all referenced scheduled fixtures and equipment appearing on the Plumbing Drawings.

B. All floor drains installed on this project shall be equipped with trap primers. The trap primer and piping is not shown on the drawings and shall be located in the field by the Contractor as dictated by field piping conditions.

C. The Plumbing Drawings and Specifications are intended to supplement each other so that any details shown on the Drawings and not mentioned in the Specifications, or vice-versa, shall be executed the same as if mentioned in the Specifications and shown on the Drawings.
D. Refer to the Architectural, Structural, and other Mechanical and Electrical Drawings, which indicate the construction in which this Work shall be installed. Locations shown on the plans shall be checked against the general and detailed Drawings of the construction proper. All measurements shall be taken at the Building.

1.14 VALVE TAGS, NAMEPLATES, AND CHARTS

A. All valves on pipes of every description shall have neat circular brass valve tags at least 1-1/2 in. in diameter attached with brass hook to each valve stem. Stamp on these valve tags, in letters as large as practical, the number of the valve and the service, such as "H.W., C.W., GAS", for hot water, cold water, and gas respectively. The numbers for each service shall be consecutive. Where valves are located above ACT ceilings, furnish and install valve finder ceiling tack, tack shall be minimum 7/8 in. diameter with 1/2 in. steel point, color as determined by Owner.

B. All valves on tanks and pumps shall be numbered by 3 in. red metal discs with white numbers 2 in. high, secured to stem of valves by means of small solid link brass chain, to correspond to numbers indicated for valves on the Record Drawings and on two (2) printed detailed lists. These printed lists shall state the numbers and locations of each valve and the fixture or group of fixtures which it controls, and other necessary information such as requiring the opening or closing of another valve or valves when any one valve is to be opened and closed, and shall be prepared in form to meet approval of the Architect, and shall be framed under glass.

C. Nameplates, catalog numbers, and rating identifications shall be securely attached to Electrical and Mechanical equipment with screws or rivets. Adhesives or cements will not be permitted.

1.15 PIPE MARKER IDENTIFICATION SYSTEM

A. Mark all piping installed under this Section and at all Access Panels with a marking system in basic colors conforming to those specified in ANSI/ASME A-13.1. Markings shall indicate pipe content and direction of flow. Markers shall be applied at all valves and tee joints, and on straight runs of pipe at every 20 ft.-0 in. on center.

B. Markers shall be vinyl snap-around pipe type system. Adhesive markings are not acceptable.
C. Clearly mark potable and non-potable water system with 4 inch wide colored bands, with arrow for direction of flow, every twenty-five (25) feet on center on all piping installed whether it is concealed or exposed and also on both sides of floor and/or wall penetrations. Mark potable water green and non-potable yellow. Within 6 in. of each band identify with letter "Potable C.W.", Non-Potable H.W." Color of letter shall match banding.

1.16 SANITARY, WASTE, AND VENT SYSTEMS

A. Furnish and install complete Sanitary, Waste, and Vent Systems (all hereinafter called Drainage Systems) to convey wastes from all Soil and Waste Stacks, Fixtures, and Equipment as indicated and/or described in these Plans and Specifications. Urinal waste shall be 2 in. cast iron or sizes indicated on the drawings. Waste piping smaller than 3 in. shall not be used underground. The use of double "Y's" in the horizontal shall not be permitted. All piping shall be installed straight and true and located concealed within building construction.

B. All horizontal Drainage Systems Piping within the building, 3 in. and smaller, shall be pitched at least 1/4 in. per ft. in the direction of flow. Drainage Piping 4 in. and larger shall be pitched at least 1/8 in. per ft. Make changes in direction of drainage lines with 45 wyes, long turn wyes, or sweep bends.

C. Furnish and install all cleanouts indicated on the Drawings and/or where required in Drainage Pipes regardless of size so that the distance between cleanouts does not exceed 45 ft. o.c. Cleanouts shall be installed at the base of all risers and at each change of direction.

D. Refer to drawings for termination points, which generally are connection to existing piping or to 10 feet outside the building.

1.17 DOMESTIC WATER SYSTEMS (POTABLE & NON-POTABLE)

A. Furnish, install, sterilize, and test in accordance with the documents and the Plumbing Code, complete potable and non-potable Domestic Cold, Hot, and Hot Water Recirculating Systems including all piping, valves, low point drains, shock absorbers, hangers, insulation, backflow preventers and water heating equipment. Clearly mark the systems as provided above. This work shall start as indicated on the Drawings.

B. In general, piping shall pitch upward in the direction of flow with each branch and riser separately valved and with 1/2 in. hose end drain on the outlet side of the valve and at all low points in the system. Install shutoff valves for each battery of fixtures and other valves as necessary to isolate any part of each system.
C. Install shock absorbers on hot and cold water piping to each fixture. Provide shock absorbers at all quick closing valves and as shown on the Drawings and/or specified.

D. Install a 1/2 inch hose bibb in each toilet room provided with a floor drain. The hose bibb shall be installed under a lavatory.

1.18 FUEL GAS SYSTEM

A. Furnish and install a complete Natural Gas Supply System including pipe, fittings, valves, connections to all gas fired equipment requiring gas, and all accessories and incidentals as indicated or specified. Installation shall be made in accordance with the State Gas Code requirements. Piping shall be installed with an 8 in. long sediment leg at the base of all risers. All changes in direction shall be made with plugged tees for cleaning piping out.

B. All horizontal Gas Piping shall be pitched not less than 1/4 in. in 15 ft. to prevent traps. Pitch piping to risers. Install an 8 in. long sediment leg at the base of all risers. All changes in direction shall be made with plugged tees for cleaning piping out. All horizontal branch outlet pipes shall be taken from the top or side of horizontal mains and not from the bottom. Install shutoff valves for each battery of equipment and other valves as necessary to isolate any part of each system.

C. Arrange with the Local Gas Company for the installation of the gas meters, services, and gas pressure regulators. Refer to DIVISION 01 - GENERAL REQUIREMENTS for information regarding Utility Company Charges.

D. Provide seismic restraints for all gas piping per requirements of the Mass. Building Code. Refer also to Section 230548.

1.19 EQUIPMENT FURNISHED BY OTHERS

A. Miscellaneous items, including but not necessarily limited to the following, shall be furnished and set by others as specified in other SECTIONS of the Documents.
   1. Dishwashers
   2. Refrigerators

B. Verify the extent of the connection requirements from the General, Architectural, and Mechanical Plans and Specifications.

C. The Plumbing Subcontractor shall be responsible in making final connections to all equipment furnished by others, to ascertain complete cross-connection prevention compliance, and to furnish and install vacuum breaker and backflow preventers which may be required to be Code compliant and are not so furnished with the equipment.
D. All sinks are intended to be "Accessible" and all drain outlets on all sinks and lavatories where furnished by the Plumbing Subcontractor or the other SECTIONS shall have an off-set drain. Set all roughing tight to wall in all cases to comply with ADA Standards. Provide where required ADA insulation kits to prevent injury where a barrier is not included in the casework. Refer to Equipment Drawings.

1.20 DEMOLITION

A. When and as directed by the General Contractor perform all demolition work.

B. All hangers, valves, piping, pumps, fixtures, controllers, and other miscellaneous equipment and materials in the existing building not specifically designated for reuse in the documents shall remain the property of the Owner.

C. Remove as indicated existing Plumbing piping, fixtures, and equipment including all hangers and supports and disconnect all Plumbing connections to equipment to be removed under other Sections of the Specifications. Clean, recondition, and relocate where indicated all items to be reused.

1. Carefully remove shower and toilet room fixtures and trim and deliver in good condition to an on-site location designated by the Architect. The Owner will review all the fixtures and trim and select the items to be kept and the items to be disposed. The disposal of all items not wanted by Owner is specified by the Demolition Section.

2. In cases where main piping is to remain, remove all existing piping to fixtures being removed and cap said piping back to riser or main. All caps or plugs to be installed shall be of like material as pipe being capped or plugged.

3. All piping, valves, hangers, and fittings shall be removed from ceiling and walls as indicated and placed on the floor by this Section. The General Contractor shall remove from the floor and dispose.

4. Any disputes between this Subcontractor and other Contractors or Subcontractors relative to the responsibility for removal of equipment shall be referred to the Architect for decision. The Architect's decision shall be firm and binding and to whomever he designates responsibility for removal of equipment shall do so without any additional cost to the Owner.

1.21 PAINTING

A. All interior exposed piping is to be painted and all painting, except as noted, will be done by the Painting Subcontractor. All uncovered piping and hangers shall be thoroughly cleaned of rust, oil, and other containments by the Plumbing Subcontractor and left ready to receive primer coat.

B. Painting for pipe markings shall be done under this Section.
C. Painting of exterior gas piping at gas meter, on roof, and at rooftop equipment, shall be done under this Section.

1.22 HOISTING EQUIPMENT AND MACHINERY

A. Unless otherwise specified, all hoisting and rigging equipment and machinery required for the proper and expeditious prosecution and progress of the Work of this Section shall be furnished, installed, operated and maintained in safe condition by each sub-contractor, as specified under Section 015000, TEMPORARY FACILITIES AND CONTROLS.

1.23 STAGING AND SCAFFOLDING

A. Unless otherwise specified, each sub-contractor shall provide all lifts and man-lifts, and furnish, erect and maintain in safe condition, all staging and scaffolding as specified under Section 015000 Temporary Facilities and Controls, as needed for proper execution of the work of this Section. Staging and scaffolding shall be of adequate design, erected and removed by experienced stage builders having all accident prevention devices required by Federal, state and local laws.

1.24 BREAKDOWN

A. Submit a breakdown of the contract price to aid the Architect in determining the value of the work installed as the job progresses.

B. No requisition will be approved until the breakdown is delivered to the Architect.

1.25 VISIT TO SITE

A. Prior to submitting a Bid, visit the site of work and become familiar with existing conditions. Any assumptions made are at this Subcontractor's expense.

PART 2 - PRODUCTS

2.1 GENERAL

A. All materials and equipment furnished under this SECTION shall be new, unused, first quality of a manufacturer of established reputation. Each valve, fitting, section of pipe, and piece of equipment supplied to project shall have cast or indelibly stamped thereon the manufacturer's name, pressure rating where applicable, type, and any other specific information provided by manufacturer. Materials shall conform to Massachusetts Code as a minimum requirement and shall appear on the Massachusetts Approved Plumbing Products list.
2.2 PIPE AND FITTINGS


B. All piping installed under this SECTION shall be in accordance with the following:

<table>
<thead>
<tr>
<th>Service</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Above ground Drainage and Vent, piping 2 in. and larger</td>
<td>No Hub cast iron soil pipe and fittings bearing collective trademark of the CISPI</td>
</tr>
<tr>
<td>Above ground drainage, and Vent piping 2 in. and smaller</td>
<td>Type ‘L’ hard tempered copper tubing</td>
</tr>
<tr>
<td>Trap primer piping from Primer to floor drain</td>
<td>Type ‘K’ soft rolled copper tubing with Swaged ends</td>
</tr>
<tr>
<td>Domestic water piping above ground (potable &amp; non-potable)</td>
<td>Type ‘L’ hard tempered copper tubing</td>
</tr>
<tr>
<td>Gas piping above ground</td>
<td>ASTM A-53 Schedule 40 black steel pipe</td>
</tr>
<tr>
<td>Gas piping below ground</td>
<td>ASTM A-53 Schedule 40 black steel pipe with fusion bonded epoxy coating Scotchkote 6233 or equal.</td>
</tr>
</tbody>
</table>

C. Fittings for underground Drainage Piping shall be service weight bell and spigot pattern C.I. soil pipe fittings. Above ground shall be no hub C.I. soil pipe fittings, Massachusetts Standard.

D. Fittings for sweat drainage piping shall be cast bronze or wrought copper of recessed drainage pattern.

E. Fittings for Type ‘L’ hard tempered copper tubing for potable and non-potable water piping 2-1/2 inch in size and smaller shall be copper press fittings.

1. Acceptable Manufacturers:
   a. Viega North America,
   b. Ridge Tool Co.
   c. Victaulic
   d. Or equal
2. Material:
   a. ASTM B88 and ANSI/ASME B16.22. O-rings for copper press fittings shall be EPDM.

3. Installation of copper press fittings and installation are to be made in strict accordance with the manufacturers installation instructions. All tubing is to be reamed prior to the installation of the fitting. The tubing shall be fully inserted into the fitting and the tubing marked at the shoulder of the fitting. The fitting alignment shall be checked against the mark on the tubing to assure the tubing is fully engaged (inserted) in the fitting. The joints shall be pressed using the tool approved by the manufacturer.

F. Grooved joint piping systems for domestic water piping 3-inch and larger shall be installed in accordance with the manufacturer’s guidelines and recommendations. All grooved couplings, fittings, valves, and specialties shall be the products of a single domestic manufacturer. Grooving tools shall be of the same manufacturer as the grooved components. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service as specified. Gaskets shall be supplied by the manufacturer. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove for proper gasket sealing. A factory trained field representative shall provide on-site training for contractor’s field personnel in the proper use of grooving tools and installation of grooved piping products. Factory trained representative shall periodically review the product installation. Contractor shall remove and replace any improperly installed products.

G. Fittings for gas piping 2-inch and smaller shall be threaded malleable iron gas pattern fittings for screwed pipe. All gas piping 2 ½ inch in size and larger shall be welded and shall utilize butt welded steel pipe fittings.

2.3 JOINTS

A. Joints for underground cast iron bell and spigot soil pipe shall be made up with resilient gaskets. Above ground shall be made up of heavy duty – 4 band stainless steel clamps, and gaskets. Couplings shall be in compliance with CISP 310 and shall bear the mark of NSF International. Couplings shall be Husky “SD 4000”, Clamp - All HI-TORQ 125, Mission “HW”, or equal.

B. Copper water tubing and fittings shall be assembled with press or grooved fittings depending on pipe size.

C. Copper waste and vent tubing with sweat fittings shall be assembled with lead free solder, Silverbrite, Oatey, Harris, or equal, and a non-corrosive flux recommended by the manufacturer.

D. Joints between copper waste/vent tubing and cast iron shall be made with cast iron threaded fittings and copper thread by sweat fittings.
E. Joints between copper tubing and ductile iron water pipe or at flanged joints to tanks shall be made with a combination iron and brass flange with composition gasket and iron bolts.

F. Joints at water heaters or other tanks having threaded connections shall be made up with dielectric unions.

G. Joints between floor or wall flanges and fixtures shall be made with one-piece special molded neoprene gaskets which shall be furnished by the fixture manufacturer.

H. Threaded pipe joints including plastics shall be made up with teflon tape.

I. Joints on screwed gas piping shall be made up with thread compound on male threads only. Welded joints shall be made up by certified welders. All joints on piping 2-1/2 in. and larger shall be welded.

2.4 VALVES

A. Furnish and install valves where indicated on the Drawings or where specified and located so that they may be operated, repaired, or replaced with a minimum effort and repacked under pressure.

B. The following list of valves is intended only as a guide for type and quality. Valves shall be as manufactured by Apollo, Milwaukee, Nibco, Elkhart, Watts or approved equal.

- Shutoff valves: Apollo #94VLF-A lead-free ball valves
- Balancing valves: Bell & Gossett Model CB lead free calibrated balance valve
- Stop and waste valves: Apollo #95LF-203 through #95LF-205, lead-free
- Check valves: Walworth #406 SJ
- Gas service stops, 2 in. and smaller: Apollo #70-102-07 through #70-108-07 with tee handle
- Gas service stops, 2-1/2 in. and larger: Rockwell #143 lubricated plug valve
- Drain valves: Apollo #77WLF-HC ball valve with cap and chain 1/2 in. x 3/4 in. hose end
Backwater Valve (Drainage Systems)  Zurn #Z1095.  At below grade installations provide with extension to grade Zurn model Z1095-FC, height as required.

2.5 INSULATION

A. Insulation for all water piping whether concealed or exposed shall be 1 in. thick, heavy density, preformed snap-on insulation equal to Johns Manville Micro-Lok HP, 850 degrees snap-on system. Insulation for cold water piping shall have a factory applied vapor barrier with ends and butts sealed with overlapping 4 in. sealing strips.

B. Valves and fittings shall be insulated with pre-formed fiberglass fitting insulation cut from dense fiberglass blanket and covered with pre-molded P.V.C. fitting covers. P.V.C. covers shall overlap the adjoining insulation and shall be secured with pressure sensitive vinyl tape over a vapor barrier adhesive seal at the joints. (Note: Staples or tacks are not permitted on covers).

C. All insulation shall have self-sealing type, all service jacket (ASJ-SSL) factory applied. At all exposed piping, cover jacket with continuous P.V.C. jacket.

D. Sealers, solvents, tapes, and adhesives, and mastics used in conjunction with the installation of insulation under this Section shall possess the maximum possible fire safe qualities available and shall be NFPA approved.

E. Covering shall be applied over clean and dry surfaces. No covering shall be applied until after the approval of all pressure and leakage tests.

F. Insulation shall be as manufactured by Johns Manville, Inc., Owens-Corning Fiberglass Corporation SSL II-ASJ, or Knauf Insulation 1000. Insulation shall be applied by skilled insulation mechanics in a first class manner.

2.6 TRAPS

A. Furnish and install traps with cleanouts on all fixtures and equipment requiring connection to the sanitary system of the same size and material as the pipe on which they occur. Traps installed on threaded pipe shall be recessed drainage pattern.

2.7 DRAIN VALVES

A. It shall be possible to drain the water from all sections of the Potable and Non-Potable Hot and Cold Water Piping. Furnish and install 1/2 in. x 3/4 in. hose end ball valves with cap and chain. (see 2.04 for model no.)
2.8 SHOCK ABSORBERS
A.  Furnish and install, where shown on Drawings and where required to prevent water hammer, Zurn Manufacturing Company model 1250-XL lead free shock absorbers, or equal, as manufactured by J.R. Smith Manufacturing Company, Josam Manufacturing Company, or equal.
B.  Installation of absorbers shall be as per manufacturer's recommendations.

2.9 PIPING ACCESSORIES
A.  Pressure and Temperature Relief Valves shall be A.S.M.E. rated temperature relief 210 deg. F. double BTU rated, self-closing, as manufactured by Watts Regulator Company or equal by Wilkins, McDonnell and Miller, or equal.
B.  Vacuum reliefs shall be lead free Watts Regulator Company #LFN36 or equal by Wilkins or Lawler.
C.  Temperature gauges shall be 4-1/2 in. diameter dial thermometers, any angle, and range of 30 degrees F. to 240 degrees F. as manufactured by Weiss Instruments, U.S. Gauge, Trerice or equal.
D.  Potable and non-potable Water system pressure gauges shall be 4-1/2 in. diameter with a range of 0 to 160 psi as manufactured by Weiss Instruments, U.S. Gauge, Trerice or equal.
E.  Natural gas system pressure gauges shall be 4 inch diameter with a range of 0 to 30 inches of water as manufactured by Weiss Instruments, U.S. Gauge, Trerice or equal.
F.  Trap primer connections are required on all floor drains to maintain trap seal. The requirement for trap primer connections shall include all floor drains in the kitchen including trough drains furnished by others. Trap primers shall be Precision Plumbing Products, Inc., Model PRO1-500 flow activated prime-pro trap-primer valve or shall, where appropriate, be Zurn, Josam, Smith or equal in-line connections installed on flush valve supply. Electronic trap primer shall be Precision Plumbing Products, Inc. Model MPB-500 mini-prime electronic trap-primer manifold, 120 volt, single phase. Furnish distribution units as required.

2.10 HOSE BIBB
A.  Hose bibb shall be T & S Brass or equal model #B-720 modified, chrome plated, 3/4 in. hose end, integral stop, vacuum breaker, modified with lock shield and loose tee handle.
B.  Hose bibbs shall be manufactured by T&S Brass, Speakman, Chicago, or equal.
2.11 CLEANOUTS

A. Cleanout plugs on the Sanitary System shall be of heavy cast brass of the screwed type. Plugs shall be full size up to and including 4 inch.

B. For piping running under floor slab, cleanouts shall be brought up to just under the floor slab level. Furnish and install access cover for all floor-type cleanouts, Zurn ZN-1400 Series with scoriated nickel bronze or by Josam, J.R. Smith, or equal.

2.12 ACCESS DOORS

A. Furnish Access Doors for access to all concealed control valves, cleanouts, valves, expansion joints, and to all other concealed parts of the Plumbing System that require accessibility for the proper operation and maintenance of the system. These doors shall be installed under the appropriate SECTION of the Specifications as determined by the surface upon which the panels are mounted.

B. All Access Doors shall be located in a workmanlike manner in closets, storage rooms, and/or other non-public areas, positioned so that the valve or part can be easily reached, and the size shall be sufficient for this purpose (minimum size 12 in. x 16 in.). Furnish Access Doors for each pipe space to permit thorough inspection of same. When access doors are required in corridors, lobbies, or other habitable areas, they shall be located as directed by the Architect.

C. Access doors shall be prime painted and completed with cylinder lock and two (2) keys as manufactured by Acudor, Inland Steel Products Company "Milcor", or Walsh-Hannon-Gladwin, Inc., "Way Loctor". Type shall be as follows:

1. Acoustical Tile Ceiling Acudor AT-5020
2. G.W.B. Surfaces Acudor DW-5040
3. Masonry Construction Acudor UF-5000
4. Fire Rated Construction Acudor FB-5060

D. Access Door Shop Drawings shall be submitted to the Architect for approval.

2.13 SUPPLEMENTARY STEEL, CHANNEL, AND SUPPORTS

A. Furnish and install all supplementary steel, channels, and supports required for the proper installation, mounting, and support of all equipment.

B. Supplementary Steel and Channels shall be firmly connected to building construction in a manner approved by the Architect.
C. The type and size of the Supporting Channels and Supplementary Steel shall be determined by the Plumbing Subcontractor and shall be sufficient strength and size to allow only a minimum deflection in conformance with the manufacturer's requirements for loading.

D. All Supplementary Steel and Channel shall be installed in a neat and workmanlike manner parallel to the walls, floor, and ceiling construction. All turns shall be made with 90 deg. fittings, as necessary to suit the construction and installation conditions.

2.14 HANGERS, ANCHORS, GUIDES, AND PIERS

A. All piping shall be supported from the Building Structure by means of approved hangers and supports. Piping shall be supported to maintain required grading and pitching of lines, to prevent vibration, and to secure piping in place, and shall be so arranged as to provide for expansion and contraction.

B. The spacing for hangers for horizontal piping shall be in accordance with the following:
   1. Cast Iron Soil Pipe: 5 ft.-0 in. at the hubs for 5 ft. lengths. For 10 ft. lengths, use one (1) hanger at the hub and one (1) at midpoint of the length. Install cast iron pipe in accordance with CISPI Handbook - latest edition.
   2. Copper Tubing: 6 ft.-0 in. o.c. for 1-1/4 in. and smaller, and 10 ft.-0 in. o.c. for 1-1/2 in. and larger.
   3. Steel Pipe: 10 ft.-0 in. o.c. for 1-1/2 in. and over; 8 ft. - 0 in. for 1-1/4 in.; 6 ft. – 0 in. for 1 in. and smaller.

C. Hanger rod diameter shall be as follows:

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Rod Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2 in. thru 2 in.</td>
<td>3/8 in.</td>
</tr>
<tr>
<td>2-1/2 in. and 3 in.</td>
<td>1/2 in.</td>
</tr>
<tr>
<td>4 in. and 5 in.</td>
<td>5/8 in.</td>
</tr>
<tr>
<td>6 in.</td>
<td>3/4 in.</td>
</tr>
<tr>
<td>8 in. and over</td>
<td>7/8 in.</td>
</tr>
</tbody>
</table>

D. Vertical lines shall be adequately supported at their bases by a suitable hanger placed in the horizontal line near the riser and at every 10 ft. interval.
E. All Hangers shall be adjustable Clevis Hanger. Hanger rods shall have machine threads. Malleable iron brackets of approved type shall be used along the walls. All Hangers for copper tubing shall be copper plated except where pipe is insulated, in which case, Steel Clevis Hanger and pipe shield shall be used.

F. Piping shall not be hung from the hangers of other trades.

G. Provide seismic restraints for all piping per requirements of the MA Building Code and Section 230548. All gas piping shall be seismically restrained.

H. Hangers shall be manufactured by Grinnell, Carpenter and Paterson, Fee and Mason, or equal.

I. Wire and strap hangers will not be permitted in this installation.

J. Install a 14 gauge metal pipe shield between pipe insulation and all pipe hangers. Hangers shall be sized so that the pipe insulation passes through the hanger and is supported on the shield.

2.15 DRAINS

A. Furnish and install all floor drains where shown on the Drawings.

B. All floor drains in flooring systems without waterproofing membranes shall have galvanized iron clamping rings with 6-pound lead flashing to bond 9 in. in all directions. All drains shall be checked with Architect's Drawings to determine depth of the flashing collar. Brass extension pieces shall be provided if necessary.

C. All floor drains installed on this project shall be fitted with Automatic Trap Primer Connections. Field determine appropriate location for Trap Primer valve and drain piping.

D. Drain Schedule:
   1. Type "A" – Zurn #ZN-415-SBZ-P dura coated cast iron body with bottom outlet, combination invertible membrane clamp, adjustable collar, seepage slots, type BZ polished nickel bronze, light-duty, leveling strainer, trap primer connection.

E. Drains shall be of one manufacturer, by Zurn, J.R. Smith, Josam, or equal.

F. In bathrooms, coordinate all floor drain locations in field with Architect. Drain locations shall not conflict with toilet partition walls.
2.16 PLUMBING FIXTURES

A. Furnish and install all fixtures and equipment, including supports, connections, fittings, and any incidentals, to make a complete installation in accordance with the Drawings and as specified.

B. The Architect shall be final judge as to whether fixtures and trim fulfill the requirements of the Specifications and as to whether they are of suitable quality.

C. All fixtures requiring hot and cold water shall have the cold water faucet on the right hand side of the fixture and the hot water faucet on the left hand side of the fixture.

D. Escutcheons shall be furnished and installed on all supplies and traps. Escutcheons shall be one (1) piece chrome plated brass with set screws.

E. All fixtures shall have the manufacturer's guaranteed label or trademark indicating first quality. All acid resisting enameled ware shall bear the manufacturer's symbol signifying acid resisting material.

F. Unless otherwise specified, faucets and all exposed fittings shall be chromium plated.

G. All supply pipes shall run in a reasonable straight vertical line from the stops to faucets. Traps shall be installed perpendicular to walls.

H. Vitreous china and acid resisting enameled fixtures shall be of one manufacturer by Sloan, American Standard, Toto, or equal. Trim shall be Symmons, Speakman, Chicago, T & S Brass, or equal. Flush valves shall be Sloan, Toto, Zurn, or equal. Water coolers and drinking fountains shall be manufactured by Elkay, Just, Filtrine, or equal. Stainless steel sinks shall be Elkay, Just, Kindred, or equal.

I. Note: All fixtures and fittings shall be vandal proof mounted, unless specifically noted otherwise.

J. Carefully coordinate roughing for flush valves so that the dimension from top of fixture to C-L of flush valve is a minimum of 6 in..
K. Fixture Schedule:

1. P-1 Water Closet:
   American Standard “Afwall” 1.28 gallon per flush bowl, vitreous china, wall hung, elongated, siphon jet bowl, 1-1/2 in. top spud.

   Sloan "Royal" 111-1.28, manually operated flush valve.

   Olsonite 10CT solid plastic white open front seat with check hinge.

   Zurn Z1203/Z1204 carrier. Carefully coordinate with Architect's plans to fit in wall. Use Z-1209 where required by field conditions.

2. P-1A Water Closet, Accessible:
   Same as specified for P-1 except mounting height and location shall meet Accessibility Standards. Locate handle of flush valve to wide side of toilet stall. Refer to Architect’s Drawing and request direction in field in writing before installing.

3. P-1F Water Closet, Floor Mounted:
   American Standard "Madera" FloWise, 16-1/2-inch height, 3043.001, floor mounted vitreous china elongated bowl, 1.28 gallon per flush, 1-1/2 inch inlet spud.

   Sloan "Royal" 111-1.28, manually operated flush valve.

   Olsonite 10CT solid plastic white open front seat with check hinge.

   Cast iron floor flange, bolt caps.

4. P-2 Urinal:
   American Standard “Washbrook” washout wall hung urinal, 0.125 gallon per flush.

   Sloan “Royal” 186-0.125, exposed manually operated flush valve, 0.125 gallon per flush.

   Zurn Z-1222 concealed support.

   Urinal installation shall conform to Accessibility Standards.
5. **P-3 Lavatory, Counter Mounted:**

American Standard “Aqualyn” 0476.028, counter mounted 20 in. x 18 in. vitreous china lavatory, 4-inch centers, punched for concealed armchair carrier.

Chicago EQ-A12C-23ABCP, 4-inch centers, self-generating with battery backup sensor faucet with 0.35gpm outlet, with integral thermostatic mixing valve.

McGuire Model 155-WC, 1-1/4 in. offset drain with open grid strainer.

McGuire Model H-167 (pair) C.P., 3/8 IPS angle supply with loose key stop.

McGuire Model B-8902 C.P., 1-1/4 in. x 1-1/2 in. cast brass adjustable 'P' trap with cleanout and #17 ga. tubing outlet to wall.

Conceal all exposed roughing and electrical wiring components under lavatory with Truebro Model #2018 rigid PVC enclosure. Provide two enclosures.

6. **P-4 Lavatory, Wall Hung:**

American Standard “Decorum” 9024.004EC, wall mounted 20 in. x 18 in. vitreous china lavatory, 4-inch centers, punched for concealed armchair carrier.

Chicago EQ-A12C-23ABCP, 4-inch centers, self-generating with battery backup sensor faucet with 0.35gpm outlet, with integral thermostatic mixing valve.

McGuire Model 155-WC, 1-1/4 in. offset drain with open grid strainer.

McGuire Model H-167 (pair) C.P., 3/8 IPS angle supply with loose key stop.

McGuire Model B-8902 C.P., 1-1/4 in. x 1-1/2 in. cast brass adjustable 'P' trap with cleanout and #17 ga. tubing outlet to wall.

Zurn #Z-1231 floor mounted concealed arm chair carrier.

Conceal all exposed roughing and electrical wiring components under lavatory with Truebro Model #2018 rigid PVC enclosure.
7. **P-5 Mop Receptor:**

Stern Williams, Model SB-902, 24 in. x 24 in. x 12 in. model Terrazzo mop service basin with stainless steel backsplash and caps all sides, 3 in. cast brass drain for inside caulk connection.

Kohler K-8907 service sink fitting, polished chrome, brace to wall, integral screw driver stops, vacuum breaker, 3/4 in. hose end. Install a ½ in. check valve on the supplies & provide access panel.

Furnish and install 1/2" hot and cold water Watts LF009 reduced pressure backflow preventer for soap dispenser.

8. **P-6 Electric Water Cooler w/Bottle Filler:**

Elkay Model EZWS-ERPBM28K, Bi-level Barrier Free drinking fountain, push button actuator, ADA compliant, and bottle fill station. Furnish with item #ACCESS12X38-5 front access panels.

1-1/4 in. x 1-1/2 in. rough p-trap with cleanout; 1/2 in. ball valve stop.

9. **P-7 Sink:**

Elkay LRAD-2219 single bowl, 22 in. x 19 in. x 6 in. deep self-rimming countertop mounted, 18 GA type 304 stainless steel sink with offset rear outlet; three (3) hole punched faucet ledge, sound deadening underside.

Chicago #201A-GN8A-E2805-5CP-369 concealed deck faucet with 8 in. swing gooseneck spout, 2-3/8 inch wrist blade handles, E-2805 0.5 GPM aerator.

Elkay LKAD-35, crumb cup strainer with offset 1-1/2 in. tailpiece and stainless steel ground seat stopper.

1-1/2 in. x 2 in. chrome plated P-trap with cleanout, waste outlet with escutcheon.

Pair of 1/2 in. x 3/8 in. supplies with stops and escutcheons.

Conceal all exposed roughing under sink with Truebro insulation kit.
2.17 BACKFLOW PREVENTERS

A. Backflow preventers shall be reduced pressure type furnished complete with shutoff valves, Massachusetts Approved. Backflow preventers 2-1/2 inch and smaller shall be Watts #LF009-QT-S. Backflow preventers 3 inch and larger shall be Watts 957-QT. Backflow preventers shall be lead free, all bronze, complete with strainer and soft seated check valve. Size shall be as indicated on Drawings.

B. Mount backflow preventer 3 ft. (+/-) above finished floor. Provide indirect waste funnel and run pipe to an air gapped discharge at sink or floor drain. Furnish a spare parts kit and parts list mounted in the vicinity of the device.

C. Prior to the installation of devices in the name of the Owner file for, pay for, and obtain all required permits and approvals for cross connection control devices from the Authority having Jurisdiction.

D. Backflow preventers shall be of one manufacturer, by Watts, Wilkins, Beeco, or equal.

2.18 UNION AND NIPPLES

A. All connections between copper tubing and galvanized piping or between copper tubing and all tanks (such as water heaters, chillers, and similar equipment) shall be made with dielectric unions and nipples.

B. All connection to Water Heaters, Meters, Pumps, and other equipment requiring maintenance or alteration shall be made up with unions. Unions on brass piping, 2 in. and smaller, shall be brass composition "E" in strict accordance with Federal Specification WW-U-516. On plastic piping, use unions of the same material as the piping.

C. All close and shoulder nipples shall be corresponding materials as the pipe and shall be extra heavy.

2.19 ELECTRIC POINT-OF-USE WATER HEATERS

A. Provide point of use instantaneous electric water heaters as indicated on drawings.

B. Water heaters shall be manufactured by Eemax, Chronomite, Stiebel, or approved equal.

2.20 FIRESTOP SYSTEMS

A. General: Provide firestopping at all new fire-rated construction where penetrated by the Work of this Section.
B. Refer to Section 078410 – Penetration Firestopping, for all product requirements for maintaining integrity of fire-rated construction at penetrations.

2.21 SCAFFOLDS AND STAGING

A. General: Trade Contractors shall obtain required permits for, and provide scaffolds, staging, and other similar raised platforms, required to access their Work as specified in Section 01 50 00 - Temporary Facilities and Controls and herein.

1. Scaffolding and staging required for use by this Trade Contractor pursuant to requirements of Section 01 50 00 - Temporary Facilities and Controls shall be furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Trade Contract requiring such scaffolding.

2. Each Trade Contractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the General Contractor pursuant to MGL (Refer to Section 01 50 00 - Temporary Facilities and Controls and as additionally required for dust control).

3. General Contractor is responsible to provide enclosures required for temporary heat; refer to Section 01 50 00 - Temporary Facilities and Controls.
   a. Furnishing portable ladders and mobile platforms of all required heights, which may be necessary to perform the work of this trade, are the responsibility of this Trade Contractor.

2.22 HOISTING MACHINERY AND EQUIPMENT

A. All hoisting equipment, rigging equipment, crane services and lift machinery required for the work by this Trade Contractor shall be furnished, installed, operated and maintained in safe conditions by this Trade Contractor, as referenced under Section 01 50 00 - Temporary Facilities and Controls.

PART 3 - EXECUTION

3.1 WORKMANNSHIP AND INSTALLATION METHODS

A. All work shall be installed in a first-class manner consistent with the best current practices. All materials shall be securely installed plumb and/or level, and all flush mounted equipment shall have front edge flush with finished wall surface.
B. All piping shall be installed true to line and grade in the case of underground piping. All piping above ceilings or exposed shall be grouped together, be parallel to each other, and be either parallel or perpendicular to the structure. Utilize gang hangers wherever feasible. Group all valves together where feasible.

C. Training:
1. Train the Owner's maintenance personnel on troubleshooting procedures, and servicing and preventative maintenance schedules and procedures.
2. Schedule training with Owner through the Architect with at least 7 days prior notice.

3.2 WORK COORDINATION AND JOB OPERATIONS

A. The equipment shall not be installed in congested and possible problem areas without first coordinating the installation of same.

B. Particular attention shall be directed to the coordination of piping and other equipment installed in the ceiling areas. Coordinate the elevations of all piping in hung ceiling areas to insure adequate space for the installation of recessed lighting fixtures before other mechanical equipment is installed.

C. Furnish to the General Contractor, and all other Subcontractors, all information relative to the portion of the Plumbing installation that will affect them, sufficiently in advance so that they may plan their work and installation accordingly.

D. In case of failure to give proper information as indicated above sufficiently in advance, pay for all back-charges for the modification, renovation, and relocation of any portion of the work already performed.

E. Obtain from the other trades, all information relative to the Plumbing Work to be executed in conjunction with the installation of their respective equipment.

3.3 CUTTING AND CORE DRILLING

A. Perform all cutting and core drilling operations that are outlined in Part 1 of this SECTION. Throughout the performance of the cutting and coring work, ensure that the structural integrity of the walls, floors, overhead structure, and other structural components, which are to remain, is maintained until permanent work is installed. Prior to any coring or cutting, verify all locations of same with the General Contractor. All cutting and coring is to be performed in accordance with approved Coordination Drawings.

B. Cut all masonry and concrete with an approved diamond blade concrete saw in a neat straight direction, perpendicular to the plane of the wall or floor.
C. Use a core drilling process which produces clean, sharp edges and the minimum hole size which will accommodate the size of pipe sleeve specified. Submit procedures for cutting thru existing steel beams to Architect for review.

D. The patching of holes shall be performed by Plumbing Sub-contractor utilizing methods outlined for the finish trade involved. Holes shall be patched to the satisfaction of the Architect.

3.4 CLEANING AND PROTECTION

A. Protect all materials and equipment during shipment and so as to prevent damage. Water closets, lavatories, and sinks shall be boarded over and all other fixtures shall be protected with pasted on paper. Post notice prohibiting the use of the fixtures prior to completion. Assume full responsibility for protection of work until its completion and final acceptance.

B. Keep the premises reasonably clean at all times and remove rubbish caused by the Plumbing Work as directed by the Architect.

C. Upon completion of this work, clean all fixtures and equipment installed herein and replace damaged parts. Failure to fulfill this obligation will result in back-charges for correction of the defective work.

3.5 SLEEVES, INSERTS, AND ESCUTCHEONS

A. All piping passing through slabs, floors, walls, partitions, foundation walls and grade beams, shall be sleeved and all such sleeves shall be furnished and installed by the Plumbing Subcontractor as detailed on the Drawings and herein specified. Set sleeves in concrete floors and walls as soon as forms are set and before concrete is poured. Core drilling openings shall have a sleeve caulked and grouted in place.

B. All pipes passing through floor, whether slab-on grade or above grade levels, shall be sleeved with sleeve extending 1 in. above floor. This includes all piping in toilet room pipe space, stairwells, closets, partitions and pre-cast planks.

C. All sleeves shall be Schedule 40 galvanized steel and shall be reamed. There shall be a minimum of 1 in. annular space between the sleeve and pipe provide greater clearance where seismic requirements dictate. Sleeves on insulated pipe shall be large enough to allow insulation to pass through sleeve. Sleeves on drywall, masonry, or concrete walls and partitions, shall be flush with wall on both sides.

D. The space between sleeve and pipe in all cases shall be filled with a U.L./F.M. approved caulking compound. This includes pipes concealed in chases and/or partitions.
E. Inserts where required shall be furnished and set by the Plumbing Subcontractor and where necessary may be drilled or power driven and shall be sized such that the insert will not exceed a depth of penetration of 1 in. into concrete.

F. Escutcheons: All exposed pipe, uncovered, passing through walls or floors or ceilings shall be fitted with C.P. brass spun or split type escutcheons with approved clamping device for holding in position. Floor escutcheons shall be deep enough to fit over sleeves, fastened to pipe, and extend down to floor.

3.6 TESTING

A. Test all Work in the presence of the Architect and/or Engineer and as required by Local Codes.

B. After Soil, Waste, and Vent Piping is in place and before being buried or furred in, plug lower ends and fill the system with water up to the top of stacks. Piping is to be left tight under these conditions and water lever shall be maintained intact for the period of at least four (4) hours.

C. Test all water piping by applying a hydrostatic pressure of 150 PSIG using a pump for this purpose. Make sure that all lines are properly plugged or capped and that air has been vented before applying pressure which shall remain constant without pumping for two (2) hours at least.

D. Test gas piping per State Gas Code.

E. Any leaks in joints or evidence of defective pipe on fittings disclosed by test shall be immediately corrected by replacing defective parts with new joints or materials. No makeshift repair effected by caulking threaded pipe with lead wool, application or Wilky or patented compounds will be permitted.

F. Provide testing report for all systems tested.

3.7 CHLORINATION

A. Upon completion of the Plumbing Work, thoroughly chlorinate the entire domestic water system before putting same in service. Chlorinate all work in the presence of the Architect and/or Engineer. The chlorinating agent shall be as a solution of sodium hypochlorite. Water shall be fed slowly into the new line with chlorine in the proper amount to produce a dosage of 50 PPM. Open and close all valves while system is being chlorinated.

B. After the sterilization agent has been applied for 24 hours, pay for an independent testing agency to test for residual chlorine and for presence of bacteria. A residual of not more than 5 PPM shall be required in all parts of the line.
C. If test show 5 PPM or greater of residual chlorine, flush out system until all traces of the chemical used are removed.

D. Provide testing report from independent testing agency.

3.8 INSTALLATION OF FIRESTOP SYSTEMS

A. General: Install firestop systems at all fire-rated construction where penetrated by the Work of this Section.

B. Refer to Section 078410 – Penetration Firestopping, for all installation requirements for maintaining integrity of fire-rated construction at penetrations.

3.9 SEISMIC RESTRAINTS

A. The independent engineer responsible for design of seismic restraints shall visit the project upon completion of the work to certify the installation is consistent with the approved shop drawings. The certification shall be submitted to the Architect and must precede the closing in of ceilings.

3.10 SYSTEM SHUTDOWNS

A. Coordinate shutdowns of existing systems with the Owner and submit a written request at least ten working days in advance. Minimize system shut downs as much as possible. Submit a list of all affected areas, the proposed work to be performed, and the expected length of the shut-down including time for retesting.

B. Provide temporary services to maintain active system during extended shut-downs as required for demolition and construction phasing.

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END OF INDEX
PART 1 - GENERAL

1.1 FILED SUB-BID REQUIRED

A. Time, Manner and Requirements for Submitting Sub-Bids:
   1. Sub-bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the Public Agency at a time and place as stipulated in the “Instructions to Bidders.”
   2. Each sub-bid submitted for work under this Section shall be on forms furnished by the Awarding Authority as required by Section 44F of Chapter 149 of the General Laws, as amended.
   3. Sub-bids filed with the Awarding Authority shall be accompanied by Bid Bond, Cash, Certified Check, Treasurer’s Check, or Cashier’s Check issued by a responsible bank or trust company payable to the City of New Bedford in the amount of 5 percent of the sub-bid. A sub-bid accompanied by any other form of bid deposit than those specified will be rejected.

B. The Filed Sub-Bidder for the work of this SECTION 23 00 00 shall list, in Paragraph E, of the FORM FOR SUB-BID, the name of each person, firm, or corporation, whom he proposes to use to perform the following classes of work or part thereof, at the bid price therefore:

C. Sub Sub-Bid Requirements

<table>
<thead>
<tr>
<th>CLASS OF WORK</th>
<th>PARAGRAPH NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation</td>
<td>2.4, 3.4</td>
</tr>
<tr>
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</tr>
<tr>
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<td>2.13, 3.14</td>
</tr>
<tr>
<td>Testing, Adjusting, and Balancing</td>
<td>3.15</td>
</tr>
</tbody>
</table>

If Sub-Bidder intends to perform with persons of his own staff the classes of work listed above, he must nevertheless list his own name therefore, under Paragraph E, of the FORM FOR SUB-BID.

The Work of this Section is shown on the following Drawings: M0.01, M1.01, M1.02, M2.01, M3.01, M3.02, M4.01, M4.02, M5.01, VS.1 VS.2.

D. The Trade Contractor shall also examine all other Drawings and all other Sections of the Specifications for requirements therein affecting the Work of this Section, not just those pertaining to this Sub-trade.
1.2 GENERAL PROVISIONS
A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS, which are hereby made a part of this Section of the Specifications.

1.3 DESCRIPTION OF WORK
A. The work described herein shall be interpreted as work to be done by the HVAC Subcontractor. Work to be performed by other trades will always be specifically referenced to that trade.
B. Furnish all staging, rigging, temporary support, labor, materials, and perform all operations in connection with the installation of the HVAC work.
C. Without limiting the generality thereof, the work to be performed under this Section includes complete new HVAC systems with the following major sub systems:
   1. Energy Recovery Units
   2. Exhaust Fans
   3. Ductwork with Insulation, Diffusers, Registers and Grilles
   4. Ductless Cooling Units and Air Cooled Condensing Units
   5. Terminal Heating Units
   6. Automatic temperature controls
   7. Valves
   8. Meters and Gauges
   9. Hangers and Attachments
   10. Mechanical Identification
   11. Mechanical Insulation
   12. Metal Ductwork
   13. Ductwork Accessories
   14. Air Outlets & Inlets
   15. Testing, Adjusting, Balancing, and Commissioning

1.4 RELATED WORK
A. Cutting beyond the requirements as stated herein, and patching of all openings regardless of size, is specified in the respective Sections of the trade responsible for furnishing and installing similar new materials.
B. For temporary controls, coordinate with General Contractor and/or Construction Manager.
C. For flashing of vents through roof and setting of roof curbs and flashing of such, refer to SECTION 07 60 00 - FLASHING AND SHEET METAL.
D. For power wiring of mechanical equipment refer to SECTION 26 00 00 - ELECTRICAL.
E. For excavation and backfill of below grade mechanical and related systems refer to Division 02.

F. For firestopping not called for in this Section refer to Section 07 84 10.

G. For finished painting of mechanical systems not called for in this Section refer to SECTION 09 90 00 – PAINTING AND COATING.

H. For interior concrete work relating to this Section refer to SECTION 03 00 00 - CAST IN PLACE CONCRETE.

I. For exterior concrete work relating to this Section refer to SECTION 03 00 00 - CAST IN PLACE CONCRETE.

J. For Commissioning, requirements refer to SECTION 01 91 13 - COMMISSIONING.

1.5 DEFINITIONS

A. Most terms used within the documents are industry standard. Certain words or phrases shall be understood to have specific meanings as follows:

1. Provide: Furnish and install completely connected up and in operable condition.

2. Furnish: Purchase and deliver to a specific location within the building or site.

3. Install: With respect to equipment furnished by others, install means to receive, unpack, move into position, mount and connect, including removal of packaging materials.

4. Conduit: Raceways of the metallic type which are not flexible.

5. Connect: To duct, pipe or wire up, including all branch ductwork, piping, and/or circuitry, control and disconnection devices so item is complete and ready for operation.

6. Subject to Mechanical Damage: Equipment, ductwork, piping and raceways installed exposed and less than eight feet above finished floor in mechanical rooms or other areas where heavy equipment may be in use or moved.

7. General Contractor and Construction Manager are one in the same.

1.6 CODES, ORDINANCES, AND PERMITS

A. Perform all work in accordance with the requirements of the City of New Bedford Building Department, State of Massachusetts Building Code, and applicable State and Federal Laws. Give all requisite notices, file all requisite plans, and obtain all permits required to perform HVAC Work. Pay all fees and include in the Bid.
1.7 QUALITY ASSURANCE

A. Codes and Standards:
   1. HI Compliance: Design, manufacture, and install HVAC pumps in accordance with HI Hydraulic Institute Standards”.
   2. UL Compliance: Design, manufacture, and install HVAC pumps in accordance with UL 779 "Motor Operated Water Pumps".
   3. ANSI Standards: Comply with ANSI A13.1 for pipe, valve, and equipment identification.
   4. I=B=R Compliance: Provide cast iron boilers that have been tested and rated in accordance with Institute of Boiler and Radiator Manufacturers (I=B=R) "Testing and Rating Standard for Cast Iron and Steel Heating Boiler", and bear I=B=R emblem on nameplate affixed to boiler.
   5. NFPA Compliance: Install oil fire cast iron boilers in accordance with NFPA Standard 31 "Standard for the Installation of Oil Burning Equipment".
   6. ASME Compliance: Construct cast iron boilers in accordance with ASME Boiler and Pressure Vessel Code, Section IV "Heating Boilers".
   7. UL and NEMA Compliance: Provide cast iron boiler ancillary electrical components, which have been listed and labeled UL, and comply with NEMA Standards.
   8. FM Compliance: Provide control devices and control sequences in accordance with requirements of Factory Mutual System (FM).
   9. IRI Compliance: Provided control devices and control sequences in accordance with requirements of Industrial Risk Insurance (IRI).
   10. AMCA Compliance: Test and rate air handling units in accordance with AMCA standards.
   11. AGA Compliance: Provide gas controls and devices in accordance with American Gas Associates.
   12. ARI Compliance: Test and rate air handling units in accordance with ARI 430 "Standard for Central-Station Air Handling Units", display certification symbol on units of certified models.
   13. ASHRAE Compliance: Construct and install refrigerant coils in accordance with ASHRAE 15 "Safety Code for Mechanical Refrigeration".
   14. NFPA Compliance: Provide air handling unit internal insulation having flame spread rating not over 25 and smoke developed rating no higher than 50; and complying with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".
   15. UL and NEMA Compliance: Provide electrical components required as part of air handling units, which have been listed and labeled by UL and comply with NEMA standards.
   16. NEC Compliance: Comply with National Electrical Code (NFPA 70) as applicable to installation and electrical connections of ancillary electrical components of air handling units.
B. MSS Standard Practices: Comply with the following standards for valves:
1. MSS SP-45: Bypass and Drain Connection Standard
2. MSS SP-67: Butterfly Valves
3. MSS SP-70: Cast Iron Gate Valves, Flanged and Threaded Ends
4. MSS SP-71: Cast Iron Swing Check Valves, Flanged
5. MSS SP-72: Ball Valves with Flanged or Butt-Welding Ends for General Service
6. MSS SP-78: Cast Iron Plug Valves, Flanged and Threaded Ends
7. MSS SP-80: Bronze Gate, Glove Angle and Check Valves
8. MSS SP-84: Steel Valves - Socket Welding and Threaded Ends
9. MSS SP-85: Cast Iron Globe and Angle Valves, Flanged with Threaded Ends
10. MSS SP-92: MSS Valve User Guide

C. Automatic Temperature Control Contractor Qualifications: Firms specializing in manufacturing and installation of control system for not less than 5 years.
   1. Codes and Standards:
      a. Electrical Standards: Provide electrical components of control systems which have been UL-listed and labeled, and comply with NEMA standards.
      b. NEMA Compliance: Comply with NEMA standards pertaining to components and devices for pneumatic control systems.
      c. NFPA Compliance: Comply with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems" where applicable to controls and control sequences.

1.8 DISCREPANCIES IN DOCUMENTS

A. Where Drawings or Specifications conflict or are unclear, advise Architect in writing before Award of Contract. Otherwise, Architect’s interpretation of Contract Documents shall be final, and no additional compensation shall be permitted.

B. Where Drawings or Specifications do not coincide with manufacturer’s recommendations, or with applicable codes and standards, alert Architect in writing before installation.

C. If the required material, installation, or work can be interpreted differently from drawing to drawing, for between drawings and specs, this contractor shall provide that material, installation, or work which is of the more stringent.
D. It is the intent of these contract documents to have the contractor provide systems and components that are fully complete and operational and fully suitable for the intended use. There may be situations in the documents where insufficient information exists to precisely describe a certain component or subsystem, or the routing of a system. In cases such as this, where the contractor has failed to notify the Architect of the situation in accordance with Paragraph (A) above, the contractor shall provide the specific component or subsystem with all parts necessary for the intended use, fully complete and operational, and installed in workmanlike manner.

1.9 PHASING

A. The mechanical subcontractor shall construct the subject project in phases as directed by the Architect to suit the project progress schedule, as well as the completion date of the project.

B. For additional information related to phasing, review the General Conditions and Supplementary Conditions and the Architectural drawings.

1.10 CONTRACT DRAWINGS

A. All work shown on the Drawings is intended to be approximately correct to scale, but shall be taken in a sense as diagrammatic. Sizes of ductwork and pipes and general method of running them are shown, but it is not intended to show every offset and fitting. To carry out the true intent and purpose of the plans, furnish all necessary parts to make complete working systems ready for use.

B. The HVAC Drawings and Specifications are intended to supplement each other so that any details shown on the Drawings and not mentioned in the Specifications, or vice-versa, shall be executed the same as if mentioned in the Specifications and shown on the Drawings.

C. Refer to the Architectural, Structural, and other Mechanical and Electrical Drawings which indicate the construction in which this work shall be installed. Locations shown on the plans shall be checked against the general and detailed Drawings of the construction proper. All measurements must be taken at the building.

1.11 ACCESSIBILITY

A. Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing.

B. Extend all grease fittings to an accessible location.
1.12 ROUGH IN
A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

1.13 NOTIFICATION OF RELATED TRADES
A. Notify all other trades responsible for installing chases, inserts, sleeves, anchors, louvers, etc. when ready for such installation and for final checking immediately before concrete is placed. Cooperate with such trades to obtain proper installation.

B. Leave openings in walls for pipes, ducts, etc. for mechanical and electrical work as shown on Drawings or required by layout of mechanical or electrical systems.

1.14 MECHANICAL INSTALLATIONS
A. Coordinate mechanical equipment and materials installation with other building components.

B. Verify all dimensions by field measurements.

C. Arrange for chases, slots, and openings in other building components to allow for mechanical installations.

D. Coordinate the installation of required supporting devices and sleeves to be set in poured in place concrete and other structural components, as they are constructed.

E. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the work. Give particular attention to large equipment requiring positioning prior to closing-in the building.

F. Coordinate the cutting and patching of building components to accommodate the installation of mechanical equipment and materials.

G. Where mounting heights are not detailed or dimensioned, install mechanical services and overhead equipment to provide the maximum headroom possible.

H. Install mechanical equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

I. Coordinate connection of mechanical system with overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
1.15 CUTTING AND PATCHING

A. Drilling, coring, and cutting of new and existing structures (through walls, floors, ceiling, etc.) where the largest dimension does not exceed 12” shall be by this Contractor.

B. Throughout the performance of the cutting and coring work, ensure that the structural integrity of the existing walls, floors, overhead structure, and other structural components, which are to remain, is maintained until permanent work is installed. Prior to any coring or cutting verify all locations of same with the General Contractor. All cutting and coring is to be performed in accordance with approved coordination drawings. All cutting or coring of structural must receive approval of the Architect prior to proceeding.

C. No additional compensation will be authorized for cutting and patching work that is necessitated by ill-timed, defective, or non-conforming installations.

D. Patching of surfaces shall be by the trade responsible for the surface penetrated.

E. Refer to various architectural sections for additional reference.

1.16 SUBMITTALS

A. Refer to Section 01 35 00 – SUBMITTAL PROCEDURES for submittal definitions, requirements, and procedures. The following paragraphs supplement the requirements of Section 01 35 00.

B. Submittal of Shop Drawings, product data, and samples will be accepted only when submitted by the General Contractor. Data submitted by Sub-contractors and material suppliers directly to the Architect/Engineer will not be processed.

C. Provide submittals for the following equipment:
   1. Energy Recovery Ventilators
   2. Hangers and Attachments
   3. Mechanical Identification
   4. Mechanical Insulation
   5. Ductless Cooling Units
   6. Piping, Valves and Accessories
   7. Terminal Heating Units
   8. Power and Gravity Ventilators
   9. Metal Ductwork
   10. Ductwork Accessories
   11. Air Outlets and Inlets
   12. Automatic Temperature Controls
   13. Testing, Adjusting, Balancing, and Commissioning

D. If a Shop Drawing is not accepted after two submissions, a third submission from the same manufacturer will not be considered.
E. Check Shop Drawings and other submittals to assure compliance with contract documents before submittal to A/E.

F. Review of Shop Drawings is final and no further changes shall be considered without written application. Shop Drawings review does not apply to quantities, nor relieve this Contractor of his responsibility for furnishing materials or performing his work in full compliance with these Contract Drawings and Specifications. Review of these shop drawings shall not be considered a guarantee of the measurements of this building or the conditions encountered.

1.17 SUBSTITUTIONS

A. Refer to, Section 01 62 00 – PRODUCT OPTIONS AND SUBSTITUTIONS for requirements in requesting substitutions. The following paragraphs supplement the requirements of Section 01 62 00.

B. If materials or equipment are substituted for specified items that alter the systems shown or its physical characteristics, or which have different operating characteristics, clearly note the alterations or difference and call it to the attention of the a/e. Under no circumstances shall substitutions be made unless material or equipment has been successfully operated for at least three consecutive years.

C. Any modifications to the design, as a result of approving a substitution, shall be the responsibility of this contractor. Any additional cost to this contractor or any other contractor, directly or indirectly, as a result of such substitutions, shall be the responsibility of this contractor.

1.18 PRODUCT LISTING

A. Prepare listing of major mechanical equipment and materials for the project.

B. Provide all necessary information.

C. Submit to the A/E through the General Contractor, within twenty (20) days of signing contract, this listing indicating all equipment and manufacturers, as a part of the submittal requirement. If the product list is not submitted, it will be the responsibility of the sub-contractor to submit one (1) of the three (3) named equal manufacturers.

D. When two or more items of same material or equipment are required they shall be of the same manufacturer. Product manufacturer uniformity does not apply to raw materials, bulk materials, pipe, tube, fittings (except flanged and grooved types), sheet metal, wire, steel bar stock, welding rods, solder, fasteners, motors for dissimilar equipment units, and similar items used in work, except as otherwise indicated.

E. Provide products, which are compatible within systems and other connected items.
1.19 NAMEPLATE DATA
   A. Provide permanent operational data nameplate on each item of power operated mechanical equipment, indicating manufacturer, product name, mode, number, serial number, capacity, operating, and power characteristics labels of tested compliances, and similar essential data. Locate nameplates in an accessible location.

1.20 DELIVERY, STORAGE AND HANDLING
   A. Refer to Section General Conditions for delivery, storage, and handling of equipment. The following paragraphs supplement the requirements of Section General Conditions.
   B. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications; adequately packaged and protected to prevent damage during shipment, storage, and handling.
   C. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage.
   D. Coordinate deliveries of mechanical materials and equipment to minimize construction site congestion. Limit each shipment of materials and equipment to the items and quantities needed for the smooth and efficient flow of installations.

1.21 RECORD DOCUMENTS
   A. Refer to 01 78 00, the general conditions, and the supplementary conditions for requirements for record documents. The following paragraphs supplement the above.
   B. Mark Drawings to indicate revisions to piping and ductwork, size and location both exterior and interior; including locations of coils, dampers and other control devices, filters, boxes, and similar units requiring periodic maintenance or repair; actual equipment locations, dimensioned from column lines; concealed equipment, dimensioned to column line; mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located.

1.22 COORDINATION DRAWINGS
   A. Refer to Division 01 before materials are purchased or work is begun, prepare and submit to the Architect, Coordination Drawings showing the size and location of all equipment and piping lines relevant to the complete system. Ensure that these Drawings are compatible and correctly annotated and cross-referenced at their interfaces.
B. The General Contractor shall be responsible for the coordination of all mechanical and electrical work. Before materials are fabricated or work begun, he shall submit to the Architect complete Coordination Drawings in the form of reproducible (vellum) transparencies at not less that ¼ inch scale. Congested areas and sections through shafts shall be prepared at not less than 3/8 inch scale, such areas being as determined by the Architect. The General Contractor may request electronic files, from the Architect, to generate the indication of the building shell background for the Coordination Drawings.

C. Coordination Drawings shall indicate the necessary offsets for all ductwork, piping, conduit, and other items to clear the work of all other trades and to maintain the required ceiling height and partition layout. Each subcontractor shall indicate both top and bottom elevations of their equipment taking into account hangers, flanges, and other accessories.

D. Prepare Coordination Drawings as follows:
1. The General Contractor shall require the HVAC Subcontractor to prepare original Drawings showing all his/her equipment, ducts, and piping on these transparencies.
2. The General Contractor shall have vellum transparencies made therefrom.
3. The General Contractor shall then require the PLUMBING Subcontractor to indicate all Plumbing piping and heating lines.
4. The General Contractor shall then require the FIRE PROTECTION Subcontractor to indicate all his/her equipment and piping on these transparencies.
5. The General Contractor shall then require the ELECTRICAL Subcontractor to indicate all his/her equipment and conduit lines on these transparencies.
6. The General Contractor shall resolve conflicts and then submit these transparencies to the Architect for review.

E. Coordination Drawings shall bear the signature of all Subcontractors involved indicating that all space conditions have been satisfactorily resolved. In addition, the Drawings shall bear the Contractor’s stamp bearing the notation “Drawings Have Been Checked and Coordinated with All Trades”. Drawings without these notations will not be accepted by the Architect.

F. If any space conflicts cannot be resolved by the Contractor, he shall immediately notify the Architect and request disposition of the conflict.

G. Coordination Drawings are for the Contractor’s and Architect’s use during construction and shall not be construed as replacing any Shop, “As-Built”, or Record Drawings required elsewhere in these Contract Documents.

H. Architect’s review of Coordination Drawings shall not relieve the Contractor from his overall responsibility for coordination of all work performed pursuant to the Contract or from any other requirement of the Contract.
1.23 OPERATION AND MAINTENANCE DATA

A. Refer to Section 01 77 30 – PROJECT CLOSEOUT AND FINAL COMPLETION for procedures and requirements for preparation and submittal of maintenance manuals. The following paragraphs supplement the requirements of Section 01 77 30.

B. In addition to the information required by Section 01 77 30 for maintenance data, include the following information:
   1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.
   2. Manufacturer's printed operating procedures to include start-up, break-in, routine and normal operating instructions; regulation, control, stopping, shut-down, and emergency instructions; and user summer and winter operating instructions.
   3. Maintenance procedures for routine preventative maintenance and trouble-shooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
   4. Servicing instructions and lubrication charts and schedules.
   5. Videotape all demonstrations and training sessions and provide (3) DVD copies to the Owner

1.24 ENERGY REBATE PROGRAM

A. This project has been designed to incorporate equipment approved for energy rebate such as boilers, high efficiency motors, chillers, etc. Meet with Utility Company prior to submitting shop drawing to ascertain that submittal meets program guidelines.

1.25 WARRANTIES

A. The contractor shall provide a two (2) year minimum warrantee on all product (unless otherwise stated in the product specification for a specific product) and labor for work under this section.

B. Refer to Section General Conditions and Section 01 77 30 – PROJECT CLOSEOUT AND FINAL COMPLETION for additional procedures and submittal requirements for warranties.
1.26 WELDING QUALIFICATIONS

A. Piping shall be welded in accordance with qualifications procedures using performance qualified welders and welding operators. Procedures and welders shall be qualified in accordance with ASME BPV IX. Welding procedures qualified by others, and welders and welding operations qualified by another employer may be accepted as permitted by ASME B31.1. The Owner’s Representative shall be notified 24 hours in advance of tests and the tests shall be performed at the work site if practicable. The welder or welding operator shall apply his assigned symbol near each weld he makes as a permanent record. Structural members shall be welded in accordance with Division 1.

B. When open-flame or spark producing tools such as welding equipment, and the like are required in the process of executing the work, the General Contractor shall be notified not less than twenty four hours in advance of the time that the work is to begin and the location where work is to be performed. Provide fire protective covering and maintain constant fire watch/fire detail (by the New Bedford Fire Department) where work is being performed and until it is completed. This Contractor shall be responsible for obtaining required permit and paying all permit fees and fire watch detail expenses.

1.27 COMMISSIONING

A. Where indicated in the equipment or commissioning specifications, engage a factory-authorized service representative, to perform startup service as per functional test sheets and requirements of Section 01 91 13 – Commissioning.

B. Complete installation and startup checks and functional tests according to Section 01 91 13 Commissioning and manufacturers written instructions.

C. Operational Test: After electrical system has been energized, start units to confirm proper unit operation. Rectify malfunctions, replace defective parts with new one and repeat the startup procedure.

D. Verify that equipment is installed and commissioned as per requirements of section 01 91 13 and manufacturers written instructions/requirements.

PART 2 - PRODUCTS

2.1 ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT (Refer to Section 019113 Commissioning for additional contract requirements)

A. Pursuant to Massachusetts General Laws Chapter 141, a Massachusetts Licensed electrician shall install all low and line voltage wiring required by this section.
B. General: The following are basic requirements for simple or common motors. For special motors, more detailed and specific requirements are specified in the individual equipment specifications.

1. All motors for all mechanical equipment shall be premium efficiency matching the following:

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2. Torque characteristics shall be sufficient to satisfactorily accelerate the driven loads.

3. Motor sizes shall be large enough so that the driven load will not require the motor to operate in the service factor range.

4. 2-speed motors shall have 2 separate windings on poly-phase motors.

5. Temperature Rating: Rated for 40 deg. C. environment with maximum 50 deg. C temperature rise for continuous duty at full load (Class A Insulation).

6. Starting Capability: Frequency of starts as indicated by automatic control system and not less than 5 evenly time spaced starts per hour for manually controlled motors.

7. Service Factor: 1.15 for poly-phase motors and 1.35 for single phase motors.


9. Frames: NEMA Standard No. 48 or 54; use driven equipment manufacturer's standards to suit specific application.

10. Bearings:
    a. Ball or roller bearings with inner and outer shaft seals.
    b. Re-greasable, except permanently sealed where motor is normally inaccessible for regular maintenance.
    c. Designed to resist thrust loading where belt drivers or other drives produce lateral or axial thrust in motor.
    d. For fractional horsepower, light duty motors, sleeve type bearings are permitted.
11. Enclosure Type:
   a. Open drip-proof motors for indoor use where satisfactorily housed or remotely located during operation.
   b. Guarded drip-proof motors where exposed to contact by employees or building occupants.
   c. Weather protected Type I for outdoor use, Type II where not housed.

12. Overload Protection: Built-in thermal overload protection and, where indicated, internal sensing device suitable for signaling and stopping motor at starter.

13. Noise Rating: "Quiet".

14. Efficiency: "Energy Efficient" motors shall have a minimum efficiency as scheduled in accordance with IEEE Standard 112, test method B. If efficiency not specified, motors shall have a higher efficiency than "average standard industry motors", in accordance with IEEE Standard 112, Test Method B.

15. Nameplate: Indicate the full identification of manufacturer, ratings, characteristics, construction, special features and similar information.

C. Starters, Electrical Devices, and Wiring: (Provided by the HVAC Contractor for Each Packaged Piece of HVAC Equipment Requiring Such):

1. Motor Starter Characteristics:
   a. Enclosures: NEMA 1, general purpose enclosures with padlock ears, except in wet locations shall be NEMA 3R with conduit hubs, or units in hazardous locations which shall have NEC proper class and division.
   b. Type and size of starter shall be as recommended by motor manufacturer and the driven equipment manufacturer for applicable protection and start-up condition.

2. Manual Switches shall have:
   a. Pilot lights and extra position for multi-speed motors.
   b. Overload Protection: Melting alloy type thermal overload relays.

3. Magnetic Starters:
   a. Maintained contact push buttons and pilot lights, properly arranged for single speed or multi-speed operation as indicated.
   b. Trip-free thermal overload relays, each phase.
   c. Interlocks, switches and similar devices as required for coordination with control requirements of Division 23 Controls Sections.
   d. Built-in 120 volts control circuit transformer, fused from line side, where service exceeds 240 volts.
   e. Externally operated manual reset.
   f. Under-voltage release or protection.

4. Capacitors:
   a. Individual unit cells.
b. All welded steel housing.
c. Each capacitor internally fused.
d. Non-flammable synthetic liquid impregnant.
e. Craft tissue insulation.
f. Aluminum foil electrodes.
g. KVAR size shall be as required to correct motor power factor to 90% or better and shall be installed on all motors 1 horsepower and larger, that have an uncorrected power factor of less than 85% at rated load.

5. Disconnect Switches (Those specified under this Section):
   a. Fusible Switches: Fused, each phase; general duty; horsepower rated; non-teasible quick-make, quick-break mechanism; dead front line side shield; solderless lugs suitable for copper or aluminum conductors; spring reinforced fuse clips; electro silver plated current carrying parts; hinged doors; operating lever arranged for locking in the "OPEN" position; arc quenchers; capacity and characteristics as indicated.
   b. Non-fusible Switches: For equipment 2 horsepower and smaller, shall be horsepower rated; toggle switch type; quantity of poles and voltage rating as indicated. For equipment larger than 2 horsepower, switches shall be the same as fusible type.

2.2 HANGERS & ATTACHMENTS

A. Horizontal-Piping Hangers and Supports:
   1. General: Except as otherwise indicated, provide factory-fabricated horizontal piping hangers and supports complying with MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal-piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacture for each piping service. Select size of hangers and supports to exactly fit pip size for bare piping, and to insulated piping. Provide copper-plated hangers and supports for copper-piping systems.
      a. Adjustable Steel Clevises Hangers: MSS Type 1.
      b. Steel Pipe Clamps: MSS Type 4.
      c. Pipe Slides and Slide Plates: MSS Type 35, including one of the following plate types:
         1. Plate: Unguided type.
         2. Plate: Guided type.
      d. Pipe Saddle Supports: MSS Type 36, including steel pipe base-support and cast-iron floor flange.
      e. Pipe Stanchion Saddles: MSS Tube 37, including steel pipe base support and cast-iron floor flange.
      f. Adjustable Pipe Saddle Supports: MSS Type 38, including steel pipe base support and cast-iron floor flange.
g. Single Pipe Rolls: MSS Type 41.
h. Adjustable Roller Hangers: MSS Type 43.
i. Pipe Roll Stands: MSS Type 44.
j. Pipe Rolls and Plates: MSS Type 45.
k. Adjustable Pipe Roll Stands: MSS Type 46.

2. Manufacturer: Subject to compliance with requirements, provide hangers and supports of one of the following:
   a. Carpenter and Patterson, Inc.
   b. Corner & Lada Co., Inc.
   c. Elcen Metal Products Co.
   d. Fee & Mason Mfg. Co.; Div. Figgie International
   e. ITT Grinnel Corp.
   f. Or equal.

B. Vertical-Piping Clamps:
   1. General: Except as otherwise indicated, provide factory-fabricated vertical-piping clamps, complying with MSS SP-58, of one of the following types listed, selected by Installer to suit vertical piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of vertical piping clamps to exactly fit pipe size of bare pipe. Provide copper-plated clamps for copper-piping systems.
      a. Two-Bolt Riser Clamps: MSS Type 8.
      b. Four-Bolt Riser Clamps: MSS Type 42.
   2. Manufacturer: Subject to compliance with requirements, provide hangers and supports of one of the following:
      a. Carpenter and Patterson, Inc.
      b. Corner & Lada Co., Inc.
      c. Elcen Metal Products Co.
      d. Fee & Mason Mfg. Co.; Div. Figgie International
      e. ITT Grinnel Corp.
      f. Or equal.

C. Hanger-Rod Attachments:
   1. General: Except as otherwise indicated, provide factory-fabricated hanger-rod attachments complying with MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal-pipe hangers and building attachments, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hanger-rod attachments to suit hanger rods. Provide copper-plated hanger-rod attachments for copper-piping systems.
      a. Steel Turnbuckles: MSS Type 13.
      b. Swivel Turnbuckles: MSS Type 15.
      c. Malleable Iron Sockets: MSS Type 16.
2. Manufacturer: Subject to compliance with requirements, provide hangers and supports of one of the following:
   a. Carpenter and Patterson, Inc.
   b. Corner & Lada Co., Inc.
   c. Elcen Metal Products Co.
   d. Fee & Mason Mfg. Co.; Div. Figgie International
   e. ITT Grinnel Corp.
   f. Or equal.

D. Building Attachments:
1. General: Except as otherwise indicate, provide factory-fabricated building attachments complying with MSS SP-58, of one of the following MSS types listed, selected by installer to suit building substrate conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods. Provide copper-plated building attachments for copper-piping systems.
   a. Concrete Inserts: MSS Type 18.
   b. Top Beam C-Clamp: MSS Type 19.
   c. Side Beam or Channel Clamps: MSS Type 20.
   d. Center Beam Clamps: MSS Type 21.
   e. Welded Beam Attachments: MSS Type 22.
   f. C-Clamps: MSS Type 23.
   g. Top Beam Clamps: MSS Type 25.
   h. Side Beam Clamps: MSS Type 27.
   i. Steel Beam Clamps W/Eye Nut: MSS Type 28.
   j. Linked Steel Clamps W/Eye Nut: MSS Type 29.
   k. Malleable Beam Clamps: MSS Type 30.
   l. Steel Brackets: One of the following for indicated loading:
      1. Light Duty: MSS Type 31.
      2. Medium Duty: MSS Type 32.
      3. Heavy Duty: MSS Type 33.
   m. Side Beam Brackets: MSS Type 34.
   n. Plate Lugs: MSS Type 57.
   o. Horizontal Travelers: MSS Type 58.
2. Manufacturer: Subject to compliance with requirements, provide hangers and supports of one of the following:
   a. Carpenter and Patterson, Inc.
   b. Corner & Lada Co., Inc.
   c. Elcen Metal Products Co.
   d. Fee & Mason Mfg. Co.; Div. Figgie International
   e. ITT Grinnel Corp.
   f. Or equal.
E. Saddles and Shields:
1. General: Except as otherwise indicated, provide saddles or shields under piping hangers and supports, factory-fabricated, for all insulated piping. Size saddles and shields for exact fit to mate with pipe insulation.
2. Protection Saddles: MSS Type 39; fill interior voids with segments of insulation matching adjoining insulation.
3. Protection Shields: MSS Type 40; of length recommended by manufacturer to prevent crushing of insulation.
4. Manufacturer: Subject to compliance with requirements, provide thermal hanger shields of one of the following:
   a. Elcen Metal Products Co.
   b. Pipe Shields, Inc.
   c. Carpenter Patterson, Inc.
   d. ITT Grinnel Corp.
   e. Or equal.

F. Miscellaneous Materials:
1. Metal Framing: Provide products complying with NEMA STD ML 1.
2. Steel Plates, Shapes, and Bars: Provide products complying with ASTM A 36.
3. Cement Grout: Portland cement (ASTM C 150, Type I or Type III) and clean uniformly graded, natural sand (ASTM C 404, Size No. 2). Mix at a ratio of 1.0 part cement to 3.0 parts sand, by volume, with minimum amount of water required for placement and hydration.
4. Heavy Duty Steel Trapezes: Fabricate from steel shapes selected for loads required; weld steel in accordance with AWS standards.
5. Pipe Guides: Provide factory-fabricated guides, of cast semi-steel or heavy fabricated steel, consisting of bolted two-section outer cylinder and base with two-section guiding spider bolted tight to pipe. Size guide and spiders to clear pipe and insulation (if any), and cylinder. Provide guides of length recommended by manufacturer to allow indicated travel.

2.3 MECHANICAL IDENTIFICATION (Refer to Section 019113 Commissioning for additional contract requirements)

A. Plastic Pipe Markers:
1. Snap-On Type: Provide manufacturer's standard pre-printed, semi-rigid snap-on, color-coded pipe markers, complying with ANSI A13.1
2. Pressure-Sensitive Type: Provide manufacturer's standard pre-printed, permanent adhesive, color-coded, pressure-sensitive vinyl pipe markers, complying with ANSI A13.1
3. Insulation: Furnish 1" thick molded fiberglass insulation with jacket for each plastic pipe marker to be installed on uninsulated pipes subjected to fluid temperatures of 125°F (52°C) or greater. Cut length to extend 2" beyond each end of plastic pipe marker.
4. **Small Pipes:** For external diameters less than 6" (including insulation if any), provide full-band pipe markers, extending 360 degrees around pipe at each location, fastened by one of the following methods:
   a. Snap-on application of pre-tensioned semi-rigid plastic pipe marker.
   b. Adhesive lap joint in pipe marker overlap.
   c. Laminated or bonded application of pipe marker to pipe (or insulation).
   d. Taped to pipe (or insulation) with color-coded plastic adhesive tape, not less than 3/4" wide; full circle at both ends of pipe marker, tape lapped 1-1/2".

B. **Plastic Equipment Markers:**
   1. **General:** Provide manufacturer's standard laminated plastic, color-coded equipment markers. Conform to the following color code:
      a. **Green:** Cooling equipment and components.
      b. **Yellow:** Heating equipment and components.
      c. **Yellow/Green:** Combination cooling and heating equipment and components.
      d. **Blue:** Equipment and components that do not meet any of the above criteria.
   2. **Nomenclature:** Include the following, matching terminology on schedules as closely as possible:
      a. Name and plan number.
      b. Equipment service.
      c. Design capacity.
         1. Other design parameters such as pressure drop, entering and leaving conditions, rpm, etc.
   3. **Size:** Provide approximate 2-1/2" x 6" markers for each piece of equipment.
   4. **Application:** Provide equipment labels for the following equipment:
      a. Rooftop Units
      b. Exhaust Fans
      c. Ductless Cooling Units
      d. Boilers
      e. Pumps

2.4 **MECHANICAL INSULATION**

A. **Piping Insulation Materials:**
   1. **Fiberglass Piping Insulation:** ASTM C 547, Class 45 required.
      a. Class 1 for use to 450 degrees F; Class 2 for use to 650 degrees F; Class 3 for use to 1200 degrees F.
   2. **Flexible Unicellular Piping Insulation:** ASTM C 534, Type as required.
      a. Type I - tubular; Type II - sheet. For use between -40 degrees F and 200 degrees F.
4. Encase pipe fittings insulation with one-piece premolded PVC fitting covers, fastened as per manufacturer's recommendations.
5. Encase straight pipe insulation, where exposed in occupied areas, with one piece 20-mil thick PVC Jacketing. Fasten and seal as per manufacturer's recommendations.
7. Staples, Bands, Wires and Cement: As recommended by insulation manufacturer for applications indicated.
8. Adhesives, Sealants and Protective Finishes: As recommended by insulation manufacturer for applications indicated.

B. Piping Insulation Application and Thickness:
1. Application: Cold Piping (40 Degrees F to Ambient):
   a. Insulate the following cold HVAC piping systems:
      1. Air conditioner condensate drain piping.
      2. Refrigerant liquid and suction piping.
   b. Insulate each piping system specified above with the following type and thicknesses of insulation:
      1. Fiberglass: 1” thick.

C. Ductwork Insulation Materials:
1. Rigid Fiberglass Ductwork Insulation: ASTM C 612, Class as required.
   CLASS 2 - 400 DEGREES F; 4 LBS./FT3.
   CLASS 3 - 850 DEGREES F; 12 LBS./FT3.
   CLASS 4 - 1000 DEGREES F; 12 LBS./FT3.
   CLASS 5 - 1800 DEGREES F; 20 LBS./FT3.
2. Flexible Fiberglass Ductwork Insulation: ASTM C 512, Class as required.
   CLASS 2 - 400 DEGREES F; .75 LBS./FT3.
   CLASS 3 - 850 DEGREES F; 1.5 LBS./FT3.
4. Ductwork Insulation Accessories: Provide staples, bands, wire, tape, anchors, corner angles and similar accessories as recommended by insulation manufacturer for applications indicated.
5. Ductwork Insulation Compounds: Provide cements, adhesives, coatings, sealers, protective finishes and similar compounds as recommended by insulation manufacturer for applications indicated.

D. Ductwork Insulation Application and Thickness:
1. Application: Ventilation and AC System Ductwork:
   a. Insulate the following ductwork:
      1. Outdoor air intake ductwork between air entrance and air handling unit inlet.
2. HVAC supply ductwork between HVAC unit discharge and room terminal outlet.
3. Insulate neck and bells of supply diffusers.
4. HVAC return ductwork between room terminal inlet and HVAC unit inlet; except omit insulation on return ductwork located in return air ceiling plenums.
5. HVAC plenums and unit housing not pre-insulated at factory or lined.
6. Exhaust ductwork between in-line exhaust fan and point of exit in building.

b. Insulate each ductwork system specified above with the following type and thicknesses of insulation:
   1. Rigid Fiberglass: In machine rooms, fan rooms, and mechanical spaces insulate all supply air, return air and outside air ductwork with 2” thick rigid. All exposed outdoor ductwork in occupied areas shall be insulated internally with same thickness and material.
   2. Flexible Fiberglass: 2 in. thick, minimum R-8 application limited to concealed locations which shall include above ceilings, in chases, shafts etc.
   3. All outside air ductwork shall be 2” rigid.

2.5 REFRIGERANT PIPING

A. General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide materials and products complying with ANSI B31.5 Code for refrigeration piping where applicable, base pressure rating on refrigerant piping system maximum design pressures. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in refrigerant piping systems. Where more than one type of materials and products are indicated, selection is Installer’s option.

B. Material: Provide pipes and pipe fittings in accordance with the following listing:
   1. Tube Size 4-1/8” and Smaller: Copper tube; Type ACR, hard-drawn temper; wrought-copper, solder-joint fittings; brazed joints.

C. Soldered Joints: Solder joints using silver-lead solder, ASTM B32, Grade 96 TS.


E. Piping Specialties: Provide piping specialties complying with Division-23 “Hydronic Piping” in accordance with the following listing:
   1. Pipe escutcheons.
2. Drip pans.
3. Sleeves.
4. Sleeve seals.

F. Refrigerant Valves: Special valves required for refrigerant piping include the following types.
1. **Globe Shutoff Valves:** Forged brass, packed, back seating, winged seal cap, 300 degrees F (149 degrees C) temperature rating, 500 psi working pressure.
2. **Check Valves:** Forged brass, accessible internal parts, soft synthetic seat, fully guided piston and stainless steel spring, 250 degrees F (121 degrees C) temperature rating, 500 psi working pressure.
3. **Manufacturer:** Subject to compliance with requirements, provide globe and check valves of one of the following:
   a. Henry Valve CO.
   c. Sporlan Valve Co.
   d. Or equal.
4. **2-Way Solenoid Valves:** Forged brass, designed to conform to ARI 760, normally closed, Teflon valve seat, NEMA 1 solenoid enclosure, 24 volt, 60 Hz., UL-listed, ½” conduit adapter, 250 degrees F (121 degrees C) temperature rating, 400 psi working pressure.
5. **Manufacturer:** Subject to compliance with requirements, provide solenoid valves of one of the following:
   a. Alco Controls Div.; Emerson Electric Co.
   b. Automatic Switch Co.
   c. Sporland Valve Co.
   d. Or equal.
6. **Refrigerant Strainers:** Brass shell and end connections, brazed joints, monel screen, 100 mesh, UL-listed, 350 psi working pressure.
7. **Moisture-Liquid Indicators:** Forged brass, single port, removable cap, polished optical glass, solder connections, UL-listed, 200 degrees F (93 degrees C) temperature rating, 500 psi working pressure.
8. **Refrigerant Filter-Driers:** Steel shell, ceramic fired desiccant core, solder connections, UL-listed, 500 psi working pressure.
9. **Refrigerant Filter-Driers:** Corrosion-resistant steel shell, steel flange ring and spring, wrought copper fittings, ductile iron coverplate with steel cap screws, replaceable filter-drier core, 500 psi working pressure.
10. **Evaporator Pressure Regulators:** Provide corrosion-resistant, spring loaded, stainless steel springs, pressure operated, evaporator pressure regulator, in size and working pressure indicated, with copper connections.
11. **Refrigerant Discharge Line Mufflers:** Provide discharge line mufflers as recommended by equipment manufacturer for use in service indicated, UL-listed.
12. Manufacturer: Subject to compliance with requirements, provide refrigeration accessories of one of the following:
   a. Alco Controls Div.; Emerson Electric CO.
   b. Henry Valve CO.
   d. Sporlan Valve Co.
   e. Or equal.

G. Basic Vibration Control: Provide vibration control products as required in accordance with the following listing:
   1. Isolation hangers.
   2. Riser isolators.
   3. Riser support isolators.
   4. Flexible pipe connectors.

2.6 DUCTLESS COOLING UNITS (Refer to Section 019113 Commissioning for additional contract requirements)

A. The basis of design Heat Recovery Variable Refrigerant Flow system is a three pipe system consisting of a single or multiple outdoor units, multiple indoor units of various types and capacities, and multiple Flow Selector boxes, individual or central unit controls with on/off temperature settings, all connected by fully insulated refrigerant lines utilizing factory supplied, fully insulated, branching kits. Indoor units are connected to condensate piping that shall be terminated to the nearest drain point.

B. The system shall be fully capable of simultaneous heating and cooling operation as requested by the individual indoor zones that can consist of single or multiple indoor units. Refer to scheduled performance data for additional information.

C. Evaporator:
   1. General: The unit shall be factory assembled, wired and tested. Contained within the unit shall be all factory wiring and internal piping, control circuit board, and fan motor. The unit in conjunction with the wired, wall mounted controller shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, and a test run switch. Indoor unit and refrigerant pipes shall be purged with dry nitrogen before shipment from factory.

D. Cabinet: The casing shall be ABS plastic factory finish. Cabinet shall be designed for suspension mounting and horizontal operation. The rear cabinet panel shall have provisions for a field installed filtered outside air intake connection.

E. Fan: The evaporator fan shall have three high performance, double inlet, forward curve fans driven by a single motor. The fans shall be statically and dynamically balanced and run on a motor with permanently lubricated bearings. The indoor fan shall consist of three (3) speeds: low, medium, and high.
F. Vane: There shall be a motorized horizontal vane to automatically direct airflow in a horizontal and downward direction for uniform air distribution. The horizontal vane shall provide a choice of five (5) vertical airflow patterns selected by remote control. There shall also be a set of vertical vanes to provide horizontal swing airflow movement selected by remote control.

G. Filter: Return air shall be filtered by means of an easily removable washable filter.

H. Coil: The evaporator coil shall be of nonferrous construction with pre-coated aluminum strake fins on copper tubing. The multi-angled heat exchanger shall have a modified fin shape that reduces air resistance for a smoother, quieter airflow. All tube joints shall be brazed with PhosCopper or silver alloy. The coils shall be pressure tested at the factory. A condensate pan and drain shall be provided under the coil.

I. Control: The control system shall consist of two (2) microprocessors, one on each indoor and outdoor unit, interconnected by a single non-polar two-wire cable. Field wiring shall run directly from the indoor unit to the wall mounted controller with no splices. For A-Control, a three (3) conductor 14 ga. AWG wire with ground shall provide power feed and bi-directional control transmission between the outdoor and indoor units. Where separate power is supplied to the indoor and outdoor units, a two (2) 20 ga. AWG wire shall be run between the units to provide forbid-directional control communication. The system shall be capable of automatic restart when power is restored after power interruption. The system shall have self-diagnostics ability, including total hours of compressor run time. Diagnostics codes for indoor and outdoor units shall be displayed on the wired controller panel.

J. Outdoor Condensing Units:
1. Stand Alone: The outdoor unit shall be equipped with a control board that interfaces with the indoor unit to perform all necessary operation functions. The outdoor unit shall be capable of operating at 0°F, (-18°C) ambient temperature with additional low ambient controls. The outdoor unit shall be able to operate with a maximum height difference of 100 feet and have maximum refrigerant tubing length of 165 feet between indoor and outdoor units without the need for line size changes, traps or additional oil. The outdoor unit shall be completely factory assembled, piped, and wired. Each unit must be test run at the factory.
2. VRF condensing units
   a. Factory assembled, single piece, air-cooled outdoor unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, and the multiple inverter driven twin rotary compressors.
b. The maximum sound pressure rating for a single module shall not exceed 63.5 dBA sound pressure in cooling and 65.5 dBA in heating. For twinned systems the sound pressure numbers should not exceed 66.5 dBA and 68.5 dBA.

c. The outdoor unit shall include an oversized accumulator and a liquid tank for proper heating performance while allowing the indoor unit PMV valve (metering device) to shut off completely when a zone is satisfied.

d. The outdoor unit shall be protected by a High-pressure switch, High-pressure sensor, Low-pressure sensor, Fusible plug, PC board fuse, and an inverter overload protector.

e. The outdoor unit shall be capable of operating in cooling mode down to 14°F ambient air temperature and down to -4°F WB ambient air temperature in heating. For simultaneous heating and cooling the unit shall be capable of operating between 14°F and 60°F ambient air temperature.

f. The outdoor unit shall include a total oil management system that balances oil between compressors within a module, replenishes compressor oil to the compressors in a module from the oil separator if required, and allows to move oil and refrigerant between twinned units if required even if one of the units is not running.

K. Cabinet: The casing shall be constructed from galvanized steel plate, coated with a finished with an electrostatically applied, thermally fused acrylic or polyester powder coating for corrosion protection and have a factory finish. The fan grille shall be of ABS plastic.

1. Unit cabinet shall be constructed of pre-coated steel, finished on both inside and outside.

2. Unit access panels shall be removable with minimal screws and shall provide full access to the compressors, fan, and control components.

3. Compressors shall be isolated in a compartment and have an acoustic wrap to assure quiet operation.

4. The outdoor unit control panel shall include a sliding window to access adjustable controls and an LED display for setup and diagnostics.

5. Unit cabinet shall be capable of withstanding 500-hour salt spray test per Federal Test Standard No. 141 (method 6061).

L. Fan: The fan motor shall be of aerodynamic design for quiet operation, and the fan motor bearings shall be permanently lubricated. The outdoor unit shall have horizontal discharge airflow. The fan shall be mounted in front of the coil, pulling air across if from the rear and dispelling it through the front. The fan shall be provided with a raised guard to prevent contact with moving parts.

1. Outdoor fan shall discharge air vertically and be driven by a DC inverter variable speed motor with 64 steps that is capable of running down to 60 RPM.
2. Outdoor fan motor shall be totally-enclosed with permanently-lubricated bearings.
3. Motor shall be protected by internal thermal overload protection.
4. Fan blade shall be non metallic and shall be statically and dynamically balanced.
5. Outdoor fan shall be protected by a raised non metallic protective grille.

M. Coil: The L shaped condenser coil shall be of copper tubing with flat aluminum fins to reduce debris build up. The coil shall be protected with an integral metal guard. Refrigerant flow from the condenser shall be controlled by means of linear expansion valve (LEV) metering orifice. The LEV shall be control by a microprocessor controlled step motor.
   1. Coil shall be constructed of aluminum fins mechanically bonded to seamless copper tubes, which are cleaned, dehydrated, and sealed.
   2. The coil configuration shall be 4 sided and fully separated from the machine compartment for more effective heat transfer and sound isolation.
   3. The coil fins shall have a factory applied corrosion resistant blue-fin finish.

N. Compressor: The compressor shall be a scroll compressor with variable speed inverter technology. The compressor shall be driven by inverter circuit to control compressor speed. The compressor speed shall dynamically vary to match the room load for significantly increasing the efficiency of the system which results in vast energy savings. To prevent liquid from accumulating in the compressor during the off cycle, a minimal amount of current shall be intermittently applied to the compressor motor to maintain enough heat. The outdoor unit shall have an accumulator and high pressure safety switch. The compressor shall be mounted to avoid the transmission of vibration.
   1. Each outdoor unit module shall be equipped with two or three inverter driven twin rotary compressors with full range control to a level of 0.1 Hz.
   2. Compressor shall be totally enclosed in the machine compartment.
   3. Compressors shall be equipped with factory mounted crankcase heaters.
   4. Internal overloads shall protect the compressor from over-temperature operation.
   5. Motor shall be suitable for operation in an R-410A refrigerant atmosphere.
   6. Compressor assembly shall be installed on rubber vibration isolators.
   7. To maximize compressor reliability, multiple compressors, within a module, shall be started and operated in variable patterns to ensure equal run time on all compressors.
   8. To ensure maximum efficiency throughout the system operation range, no compressor is required to run at maximum speed under any condition.
O. Electrical: The electrical power of the unit shall be as indicated on the drawings. The outdoor unit shall be controlled by the microprocessor located in the indoor unit. The control signal between the indoor unit and the outdoor unit shall be pulse signal 24 volts DC. The unit shall have Pulse Amplitude Modulation circuit to utilize 98% of input power supply.

1. All sizes shall utilize 208/230-3-60 or 460-3-60 field power supply.
2. Twinned systems shall have separate field power supply to each module.
3. Two core shielded low voltage cable is shall be required for communication between outdoor and indoor unit.
4. All power and control wiring must be installed per NEC and all local electrical codes.

P. Variable Refrigerant Flow

1. System Description
   a. The variable capacity, heating/cooling change-over system shall be a (Variable Refrigerant Flow).
   b. Each indoor evaporative unit shall be provided with service isolation valves.
   c. The system shall consist of a outdoor unit, Controller, multiple indoor units (-E models), and DDC (Direct Digital Controls). Each indoor unit or group of indoor units shall be capable of operating in any mode independently of other indoor units or groups. System shall be capable of changing mode (cooling to heating, heating to cooling) with no interruption to system operation. The sum of connected capacity of all indoor air handlers shall range from 80% to 125% of outdoor rated capacity.

2. Quality Assurance
   a. The units shall be listed by Electrical Testing Laboratories (ETL) and bear the ETL label.
   b. All wiring shall be in accordance with the National Electrical Code (N.E.C.).
   c. The units shall be manufactured in a facility registered to ISO 9001 and ISO14001 which is a set of standards applying to environmental protection set by the International Standard Organization (ISO).
   d. All units must meet or exceed the 2010 Federal minimum efficiency requirements and the proposed ASHRAE 90.1 efficiency requirements for VRF systems. Efficiency shall be published in accordance with the DOE alternative test procedure, which is based on the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) Standards 340/360, 1230 and ISO Standard 13256-1.
   e. A full charge of R-410A for the condensing unit only shall be provided in the condensing unit.
   f. Units shall be listed in the AHRI directory.
g. All units shall meet the minimum Federal minimum efficiency standards and be tested per AHRI 1230 Standard.

3. Delivery, Storage and Handling
   a. Unit shall be stored and handled according to the manufacturer’s recommendation.
   b. Units shall be shipped in one piece and shall be stored and handled per unit manufacturer’s recommendations.
   c. Units shall be supplied with a base rail that provides openings for moving the unit by fork truck or rigging the unit by crane.

4. Warranty
   a. The units shall be covered by the manufacturer’s limited warranty for a period of one (1) year from date of installation. If the systems are:
      1. Designed by a certified equipment designer
      2. Installed by a contractor that has successfully completed the required training by the equipment manufacturer, and
      3. Verified with a completed commissioning report submitted to and approved by the equipment manufacturer, then the units shall be covered by an extended manufacturer’s limited warranty for a period of five (5) years from date of installation by the equipment manufacturer.

   In addition the compressor shall have a manufacturer’s limited warranty for a period of seven (7) years from date of installation.
   If, during this period, any part should fail to function properly due to defects in workmanship or material, it shall be replaced or repaired at the discretion of the manufacturer. This warranty shall not include labor.
   b. Manufacturer shall have a minimum of five years of HVAC experience in the U.S. market.
   c. All manufacturer technical and service manuals must be readily available for download by any local contractor should emergency service be required. Registering and sign-in requirements which may delay emergency service reference are not allowed.
   d. The VRF system shall be installed by a contractor with extensive equipment manufacturer install and service training. The mandatory contractor service and install training should be performed by the manufacturer.
5. Products
   a. Outdoor Unit
      1. General: The outdoor unit shall be used specifically with same equipment manufacturer’s components. The outdoor units shall be equipped with multiple circuit boards that interface to the controls system and shall perform all functions necessary for operation. Each outdoor unit module shall be completely factory assembled, piped and wired and run tested at the factory.
         a. The model nomenclature and unit requirements are shown on plans. All units requiring a factory supplied twinning kits shall be piped together in the field. If an alternate manufacturer is selected, any additional material, cost, and labor to install additional lines shall be incurred by the contractor.

<table>
<thead>
<tr>
<th>Outdoor Unit Model Nomenclature Basis of Design</th>
<th>Twinning Kit</th>
<th>208 Volt Twinning Kit</th>
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<tbody>
<tr>
<td>Model Number</td>
<td>Units</td>
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   b. Outdoor unit shall have a sound rating no higher than 66 dB(A) individually or 69 dB(A) twinned. Units shall have a sound rating no higher than 50 dB(A) individually or 53 dB(A) twinned while in night mode operation. If an alternate manufacturer is selected, any additional material, cost, and labor to meet published sound levels shall be incurred by the contractor.
   c. All refrigerant lines from the outdoor unit to the indoor units controller shall be insulated.
   d. Outdoor unit shall be able to connect to up to 40 indoor units depending upon model.
   e. The outdoor unit shall have an accumulator with refrigerant level sensors and controls.
   f. The outdoor unit shall have a high pressure safety switch, over-current protection, crankcase heater and DC bus protection.
g. The outdoor unit shall have the ability to operate with a maximum height difference of 164 feet and have total refrigerant tubing length of 985 feet. The greatest length is not to exceed 575 feet between outdoor unit and the indoor units without the need for line size changes or traps.

h. The outdoor unit shall be capable of operating in heating mode down to -4°F ambient temperature. The outdoor unit shall be capable of operating in cooling mode with required capacity down to -0°F with manufacturer supplied low ambient kit. If an alternate manufacturer is selected, any additional material, cost, and labor to meet low ambient operating condition and performance shall be incurred by the contractor.

i. Manufacturer supplied low ambient kit shall be provided with pre-designed control box rated for outdoor installation and capable of controlling kit operation automatically in all outdoor unit operation modes.

j. Manufacturer supplied low ambient kit shall be listed by Electrical Laboratories (ETL) and bear the ETL label.

k. Manufacturer supplied low ambient kit shall be factory tested in low ambient temperature chamber to ensure operation. Factory performance testing data shall be available when requested.

l. Outdoor unit shall have a high efficiency oil separator plus additional logic controls to ensure adequate oil volume in the compressor is maintained.

m. Unit must defrost all circuits simultaneously in order to resume full heating more quickly. Partial defrost which may extend “no or reduced heating” periods shall not be allowed.

6. Unit Cabinet: The casing(s) shall be fabricated of galvanized steel, bonderized and finished. Units cabinets shall be able to withstand 960 hours per ASTM B117 criteria for seacoast protected models.
7. **Fan:** Each outdoor unit module shall be furnished with one direct drive, variable speed propeller type fan. The fan shall be factory set for operation under 0 in. WG external static pressure, but capable of normal operation under a maximum of 0.24 in. WG external static pressure via dipswitch. All fan motors shall have inherent protection, have permanently lubricated bearings, and be completely variable speed. All fan motors shall be mounted for quiet operation. All fans shall be provided with a raised guard to prevent contact with moving parts. The outdoor unit shall have vertical discharge airflow.

8. **Refrigerant:** R410A refrigerant shall be required for unit systems. Polyolester (POE) oil shall be required. Prior to bidding, manufacturers using alternate oil types shall submit material safety data sheets (MSDS) and comparison of hygroscopic properties for alternate oil with list of local suppliers stocking alternate oil for approval at least two weeks prior to bidding.

9. **Coil:** The outdoor coil shall be of nonferrous construction with lanced or corrugated plate fins on copper tubing. The coil fins shall have a factory applied corrosion resistant blue-fin finish. The coil shall be protected with an integral metal guard. Refrigerant flow from the outdoor unit shall be controlled by means of an inverter driven compressor. The outdoor coil shall include 4 circuits with two position valves for each circuit, except for the last stage.

10. **Compressor:** Each outdoor unit module shall be equipped with one inverter driven scroll hermetic compressor. Non inverter-driven compressors, which cause inrush current (demand charges) and require larger wire sizing, shall not be allowed. A crankcase heater(s) shall be factory mounted on the compressor(s). The outdoor unit compressor shall have an inverter to modulate capacity. The capacity shall be completely variable with a turndown of 19%-5% of rated capacity, depending upon unit size. The compressor will be equipped with an internal thermal overload. The compressor shall be mounted to avoid the transmission of vibration. Field-installed oil equalization lines between modules are not allowed.  
    a. Prior to bidding, manufacturers requiring equalization must submit oil line sizing calculations specific to each system and module placement for this project.

11. **Electrical:** The outdoor unit electrical power shall be 208 volts, 3-phase, 60 hertz refer to mechanical schedules. The outdoor unit shall be controlled by integral microprocessors. The control circuit between the indoor units and the outdoor unit shall be 24VDC completed using a 2-conductor, twisted pair shielded cable to provide total integration of the system.

12. **Refrigerant:** R410A refrigerant shall be required.
13. Refrigerant valves: The unit shall be furnished with multiple branch circuits which can individually accommodate up to 54,000 BTUH and up to three indoor units. Branches may be twinned to allow more than 54,000 BTUH. Each branch shall have multiple two-position valves to control refrigerant flow. Service shut-off valves shall be field-provided/installed for each branch to allow service to any indoor unit without field interruption to overall system operation. Linear electronic expansion valves shall be used to control the variable refrigerant flow.

14. Integral Drain Pan: An integral condensate pan and drain shall be provided.

15. Electrical: The unit electrical power shall be 208/230 volts, 1 phase, 60 hertz. The unit shall be capable of satisfactory operation within voltage limits of 187-228 volts.

16. Controls Network: Controls Network consists of remote controllers, schedule timers, system controllers, centralized controllers, and/or integrated web based interface communicating over a high-speed communication bus. The Controls Network shall support operation monitoring, scheduling, error email distribution, personal browsers, tenant billing, online maintenance support, and integration with Building Management Systems (BMS) using BACnet® interfaces. The below figure illustrates a sample control network System Configuration.

17. Remote Controllers: Provide remote wired backlit controllers for all indoor evaporators.

18. Centralized Controller: The Centralized Controller shall be capable of controlling a maximum of 50 indoor units across multiple outdoor units. The Centralized Controller shall be approximately 8-1/2”x10” in size and shall be powered from a built-in power supply to the network transmission line. The Centralized Controller shall support operation superseding that of the remote controllers, system configuration, daily/weekly scheduling, monitoring of operation status, and malfunction monitoring. The Centralized Controller shall have five basic operation controls which can be applied to an individual indoor unit, a group of indoor units (up to 50 indoor units), or all indoor units (collective batch operation). This basic control set of operation controls for the Centralized Controller shall include on/off, operation mode selection (cool, heat, auto, dry, and fan), temperature setting, fan speed setting, and airflow direction setting. Since the GB-50ADA provides centralized control it shall be able to enable or disable operation of local remote controllers. In terms of scheduling, the GB-50ADA Centralized Controller shall allow the user to define both daily and weekly schedules with operations consisting of ON/OFF, mode selection, temperature setting, vane, direction, fan speed, and permit/prohibit of remote controllers.
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Operation</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON/OFF</td>
<td></td>
<td>Each Block, Group or Collective</td>
<td>Each Group</td>
</tr>
<tr>
<td>Operation Mode</td>
<td>Switches between Cool/Dry Dry/Auto/Fan/Heat.</td>
<td>Each Block, Group or Collective</td>
<td>Each Group</td>
</tr>
<tr>
<td>Temperature Setting</td>
<td>Sets the temperature for a single group. Range of temperature setting from 57°F – 87°F dependant on operation mode and indoor unit model.</td>
<td>Each Block, Group or Collective</td>
<td>Each Group</td>
</tr>
<tr>
<td>Fan Speed Setting</td>
<td>Models with 5 air flow speed settings: Hi/Mid-2/Mid-1/Low, Auto</td>
<td>Each Block, Group or Collective</td>
<td>Each Group</td>
</tr>
<tr>
<td></td>
<td>Models with 4 air flow speed settings: Hi/Mid-2/Mid-1/Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Models with 3 air flow speed settings: Hi/Mid/Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Models with 2 air flow speed settings: Hi/Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>* Fan speed setting (including Auto) varies depending on the indoor unit model.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air Flow Direction Setting</td>
<td>Air flow direction angles, 4-angle or 5-angle Swing, Auto</td>
<td>*1 Each Block, Group or Collective</td>
<td>Each Group</td>
</tr>
<tr>
<td></td>
<td>*1: Louver cannot be set. *Air flow direction settings vary depending on the indoor unit model.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schedule Operation</td>
<td>Annual/weekly/today schedule can be set for each group of air conditioning units. Optimized startup setting is also available. *2: The system follows either the current day, annual schedule, or weekly, which are in the descending order of overriding priority. Twenty-four events can scheduled per day, including ON/OFF, Mode, Temperature Setting, Operation Prohibition. Vane Direction, and Fan Speed. Two types of weekly schedule(Summer/Winter) can be set. Settable items depend on the functions that a given air conditioning unit supports.</td>
<td>*2 Each Block, Group or Collective</td>
<td>Each Group</td>
</tr>
<tr>
<td>Optimized Startup</td>
<td>Unit starts 5 - 60 minutes before the scheduled time based on the operation data history in order to reach the scheduled temperature at the scheduled time.</td>
<td>Each Block, Group or Collective</td>
<td>Each Group</td>
</tr>
<tr>
<td>Night Setback Setting</td>
<td>The function helps keep the indoor temperature in the temperature range while the units are stopped and during the time this function is effective.</td>
<td>Each Group</td>
<td>Each Group</td>
</tr>
<tr>
<td>Item</td>
<td>Description</td>
<td>Operation</td>
<td>Display</td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
<td>-----------</td>
<td>---------</td>
</tr>
<tr>
<td>Permit / Prohibit Local Operation</td>
<td>Individually prohibit operation of each local remote control function (Start/Stop, Change operation mode, Set temperature, Reset filter). *3: Centrally Controlled is displayed on the remote controller for prohibited functions.</td>
<td>Each Block, Group or Collective</td>
<td>*3 Each Group</td>
</tr>
<tr>
<td>Indoor Unit Intake Temp</td>
<td>Measures the intake temperature of the indoor unit when the indoor unit is operating.</td>
<td>N/A</td>
<td>Each Group</td>
</tr>
<tr>
<td>Error</td>
<td>When an error is currently occurring on an air conditioner unit, the afflicted unit and the error code are displayed *4 When an error occurs, the LED flashes. The operation monitor screen shows the abnormal unit by flashing it. The error monitor screen shows the abnormal unit address, error code and source of detection. The error log monitor screen shows the time and date, the abnormal unit address, error code and source of detection.</td>
<td>N/A</td>
<td>*4 Each Unit or Collective</td>
</tr>
<tr>
<td>Ventilation Equipment</td>
<td>This interlocked system settings can be performed by the master system controller. When setting the interlocked system, use the ventilation switch the free plan LOSSNAY settings between “Hi”, “Low” and “Stop”. When setting a group of only free plan LOSSNAY units, you can switch between “Normal ventilation”, “Interchange ventilation” and “Automatic ventilation”.</td>
<td>Each Group</td>
<td>Each Group</td>
</tr>
<tr>
<td>Interlock</td>
<td>Operation of indoor groups or general equipment can be interlocked by the change of state (ON/OFF, mode, error of indoor groups/general equipment). (GB-50 will execute interlocking control depending on the interlocked setting.)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Multiple Language</td>
<td>Other than English, the following language can be chosen. Spanish, French, Japanese, Dutch, Italian, Russian, Chinese, and Portuguese are available.</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Collective ON/OFF</td>
<td>All the units can be operated / stopped with a DIP switch.</td>
<td>Collective</td>
<td>Collective (7 SEG)</td>
</tr>
<tr>
<td>Data back-up (USB Memory)</td>
<td>The initial setting data, operation data (charge parameter) can be stored to a USB memory. Initial setting data can be read from USB memory.</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
1) All Centralized Controllers shall be equipped with one Ethernet port to support interconnection with a network PC via a closed/direct Local Area Network (LAN). The Centralized Controller shall be capable of performing initial settings via a PC using the Centralized Controller’s initial setting browser. 

2) Standard software functions shall allow the building manager to securely log into each Centralized Controller via the PC’s web browser to support operation monitoring, scheduling, error email, and online maintenance diagnostics. Standard software functions shall not expire.

19. Control Network: System Integration
   a. The Control Network shall be capable of supporting integration with Building Management Systems (BMS) via our LonWorks® and BACnet® interfaces. 
   b. BACnet® Interface. The interface, shall be compliant with BACnet® Protocol (ANSI/ASHRAE 135-2004) and be Certified by the (BTL) BACnet® Testing Laboratories. The BACnet® interface shall support a maximum of 50 indoor units. Operation and monitoring points include, but are not limited to, on/off, operation mode, fan speed, prohibit remote controller, filter sign reset, alarm state, error code, and error address. HVAC contractor and ATC Contractor shall coordinate BMS system protocol requirements for integration into existing Automated Logic BMS System.

20. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Toshiba/Carrier
   b. Mitsubishi CityMulti
   c. Daikin AC
   d. Or Equal.

21. Written prior approval required for alternate VRF System Manufacturer.

22. Written prior approved alternate manufacturer is required to coordinate any changes from the basis of design with all associated trades. Any additional costs associated with the alternate equipment shall be covered by the HVAC contractor or equipment manufacturer. No additional costs shall be incurred by the owner.

23. Shop drawings shall be submitted in accordance with 013300. Submittals should include equipment cutsheet information, proposed piping design layout and list of materials. Submittals shall be prepared by an authorized system designer and distributor.
2.7 ROOF TOP UNITS WITH ENERGY RECOVERY (Refer to Section 019113 Commissioning for additional contract requirements)

A. MANUFACTURERS
   1. Available Manufacturers: Subject to compliance with specifications contained within this document, manufacturers offering products that may be incorporated into the work include, but are not limited to:
      a. Greenheck Fan Corporation
      b. Aaon
      c. Valent
      d. Approved equal

B. MANUFACTURED UNITS
   1. Packaged Air-to-Air Energy Recovery Units shall be fully assembled at the factory and consist of an insulated metal cabinet louvered outdoor air intake with metal mesh filter assembly, motorized intake damper, filter assemblies for both intake and exhaust air, energy wheel, airside coil, engineered P trap assembly with P trap, water coil, reheat coil, supply air blower assembly, indirect gas-fired furnace, low leakage, insulated low leakage, motorized exhaust air damper, motorized unoccupied recirculating damper exhaust air blower assembly, exhaust air hood assembly and electrical control unit with all specified components and internal accessories factory installed and tested and prepared for single-point high voltage connection. Entire unit with the exception of field-installed components shall be assembled and test operated at the factory.

C. CABINET
   1. Materials: Formed double wall insulated metal cabinet, fabricated to permit access to internal components for maintenance.
   2. Outside casing: 18 gauge G60 galvanized steel. Note: pre-painted polyester on G60 galvanized steel provides highest corrosion resistance. Components that receive a painted finish per A / E specification shall be of 18 gauge type A60 galvanneal steel and shall be painted with a baked industrial enamel finish. Components that receive a painted finish per A / E specification shall be painted with a polyester urethane powder coat, color selection by Architect.
   3. Internal assemblies: 18 gauge, galvanized (G90) steel except for motor supports which shall be minimum 14 gauge galvanized (G90) steel. Inner wall of double wall construction shall be minimum 24 gauge G90 steel.
   5. Materials: Fiberglass insulation. If insulation other than fiberglass is used, it must also meet the Fire Hazard Classification shown below.
      a. Thickness: 1 inch (25 mm)
b. Fire Hazard Classification: Maximum flame spread of 25 and smoke developed of 50, when tested in accordance with ASTM C 411.

c. Location and application: Full coverage of entire cabinet exterior to include walls, roof and floor of unit. Insulation shall be of semi-rigid type and installed between inner and outer shells of all cabinet exterior components.

6. Condensate drain pan: Pan shall be formed of welded austenitic stainless steel sheet material and provided with a welded drain connection at the front for connection to a P trap. Drain pan shall be sloped in two directions to provide positive draining.

7. P trap: An engineered P trap (condensate drain) assembly shall be provided for each unit, to include cleanout ports, cleanout tool, vacuum break device and see-through reservoir to permit visual verification of water or glycol solution levels.

8. Energy wheel: Energy wheel shall be of total enthalpy, rotary air-to-air type and shall be an element of a removable energy wheel cassette. The cassette shall consist of a galvanized steel framework (designed to produce laminar air flow through the wheel), an energy wheel as specified and a motor and drive assembly. The cassette shall incorporate a pre-tensioned urethane drive belt with a five year warranty. The wheel media shall be a polymer film matrix in a stainless steel framework and be comprised of individual segments that are removable for servicing. Non-segmented energy wheels are not acceptable. The polymer film material shall be coated with silica gel desiccant and shall be designed and constructed to permit cleaning and servicing. The energy wheel is to have a five year warranty. Performance criteria are to be as specified in AHRI Standard 1060, complying with the Combined Efficiency data in the submittal.

9. Compressed refrigerant coils shall be AHRI Certified and shall be (silver) soldered or brazed into the compressed refrigerant system. Coil shall be constructed of copper tubing, permanently bonded to aluminum fins and enclosed in a galvanized steel frame. If two compressors are used as components of a packaged DX system in the ERV, then the evaporator coil shall be of “interlaced” configuration, permitting independent operation of either compressor without conflict with the other compressor.

10. Supply Air and Exhaust Air blower assemblies: Blower assemblies consist of an electric motor and a belt driven blower. Assembly shall be mounted on heavy gauge galvanized rails and further mounted on 1.125 inch thick neoprene vibration isolators.

11. Control panel / connections: Energy Recovery Unit shall have an electrical control center where all high and low voltage connections are made. Control center shall be constructed to permit single-point high voltage power supply connections. Optional electric post heater shall have a separate electrical control center and separate high voltage power circuit as shown on the plans.
12. Timed exhaust shall be provided for frost control of the energy wheel. Control system shall include an outdoor air thermostat and pressure sensor on the wheel assembly to initiate frost control sequence.

13. Reheat coil with factory installed modulating hot gas reheat valve

14. Indirect gas furnace:
   a. Shall be ETL Certified as a component of the Energy Recovery Unit.
   b. Shall have an integral exhaust gas blower
   c. Shall be ETL Certified for installation downstream of a cooling coil.
   d. Shall have fault sensors to provide fault conditions to optional digital controller or building controls.
   e. Furnace control shall be 4:1 Modulating
   f. Shall be encased in a weather-tight metal housing with intake air vents. Large, metal lift-off or hinged door shall provide easy access to the enclosed vest plate, control circuitry, gas train, burner assembly and exhaust blower.

15. Packaged DX System: Makeup Air Unit shall have an integral compressor(s) and evaporator coil located within the weather-tight unit housing. Condenser coils and appurtenant condenser fan assemblies shall be factory installed as integral subassemblies of the ERU and mounted on the exterior of the ERU. Condenser fan motors shall be three phase, type 56 frame, Open Air Over and Shaft Up. Each condenser fan motor shall have a vented frame, rated for continuous duty and be equipped with an automatic reset thermal protector. Motors shall be UL Recognized and CSA Certified. The refrigerant compressor(s) shall be digital scroll-type and shall be equipped with liquid line filter drier, thermal expansion valve (TXV), manual reset high pressure and low pressure cutouts and all appurtenant sensors, service ports and safety devices. Compressed refrigerant system shall be fully charged with R-410A refrigerant. Each compressor shall be factory-equipped with an electric crankcase heater to boil off liquid refrigerant from the oil.
   a. Packaged DX Control and Diagnostics: The Packaged DX system shall be controlled by an onboard digital controller (DDC) that indicates both owner-supplied settings and fault conditions that may occur. The DDC shall be programmed to indicate the following faults:
      1. Global alarm condition (active when there is at least one alarm)
      2. Supply Air Proving alarm
      3. Dirty Filter Alarm
      4. Compressor Trip alarm
   b. Compressor Locked Out alarm
   c. Supply Air Temperature Low Limit alarm
      1. Sensor #1 Out of Range (outside air temperature)
      2. Sensor #2 Out of Range (supply air temperature)
3. Sensor #3 Out of Range (cold coil leaving air temperature)

16. Motorized dampers: Motorized dampers of low leakage insulated low leakage type shall be factory installed.

17. Motorized Recirculating Air Damper: designed to permit 100% recirculation of exhaust air shall be factory installed. Damper shall be controlled by 2-position switch.

18. Sensors are considered to be part of various optional operational modes or device controllers and are to be factory supplied and installed as specified by the A/E. See IOM / Sensors Installed by Factory

D. BLOWER SECTION

1. Blower section construction, Supply Air and Exhaust Air: Belt drive motor and blower shall be assembled onto a 14 gauge galvanized steel platform and must have neoprene vibration isolation devices.

2. Blower assemblies: Shall be statically and dynamically balanced and designed for continuous operation at maximum rated fan speed and horsepower.

3. Centrifugal blower housing: Formed and reinforced steel panels to make curved scroll housing with shaped cutoff.

4. Forward curved blower (fan) wheels: Galvanized or aluminum construction with inlet flange and shallow blades curved forward in direction of airflow. Mechanically attached to shaft with set screws.

5. Blower section motor source quality control: Blower performance shall be factory tested for flow rate, pressure, power, air density, rotation speed and efficiency. Ratings are to be established in accordance with AMCA 210, “Laboratory Methods of Testing Fans for Rating”.

E. MOTORS

1. General: Blower motors greater than ¾ horsepower shall be “NEMA Premium™” unless otherwise indicated. Minimum compliance with EPAct minimum energy-efficiency standards for single speed ODP and TE enclosures is not acceptable. Motors shall be heavy-duty, permanently lubricated type to match the fan load and furnished at the specified voltage, phase and enclosure. Drives shall be sized for a minimum of 150% of driven horsepower and pulleys shall be fully machined cast-type, keyed and fully secured to the fan wheel and motor shafts. Electric motors of ten horsepower or less shall be supplied with an adjustable drive pulley. Comply with requirements in Division 23 00 00, matched with fan load. Motors shall be 60 cycles, 3 phase 460 volt.
F. UNIT CONTROLS:
1. The ERU shall be constructed so that it can function as a stand-alone heating and cooling system controlled by factory-supplied controllers, thermostats and sensors or it can be operated as a heating and cooling system controlled by a Building Management System (BMS). This unit shall be controlled by a factory-installed microprocessor programmable controller (DDC) that is connected to various optional sensors.
2. ERU shall incorporate a DDC controller with integral LCD screen that provides text readouts of status, operating settings and alarm conditions. DDC controller shall have a built-in keypad to permit operator to access read-out screens and change settings without the use of ancillary equipment, devices or software. DDC controllers that require the use of equipment or software that is not factory-installed in the ERU are not acceptable. Alarm readouts consisting of flashing light codes are not acceptable. Owner-specified ventilating conditions can be input by means of pushbuttons.
3. Operating protocol: The DDC shall be factory-programmed for LonWorks or BACnet MSTP or BACnet IP, coordinate with ATC Contractor.
4. Variable Frequency Drive (VFD): ERU shall have factory installed variable frequency drives for modulation of the blower motors The VFDs shall be factory-programmed for unit-specific requirements and shall not require additional field programming to operate. ERU shall have factory-installed multi-speed blower motor.

G. FILTER SECTION: Energy Recovery Unit shall have MERV 13 disposable pleated filters located in the outdoor air intake and shall be accessible from the exterior of the unit.

2.8 POWER AND GRAVITY VENTILATORS (Refer to Section 019113 Commissioning for additional contract requirements)

A. General: Except as otherwise indicated, provide standard prefabricated power and gravity ventilator units of type and size indicated, modified as necessary to comply with requirements, and as required for complete installation.

B. Refer to Division-23 automatic temperature control for control sequence.

C. ROOF FANS (EF)
1. Type: Centrifugal fan, direct or belt driven as scheduled. Provide aluminum, or galvanized steel, weatherproof housings as scheduled. Provide square base to suit roof curb. Provide permanent split-capacitor type motor for direct driven fans; capacitor-start, induction-run type motor for belt driven fans.
2. Electrical: Provide factory-wired non-fusible type disconnect switch at motor in fan housing. Provide thermal overload protection in fan motor. Provide conduit chase within unit for electrical connection.
3. Bird Screens: Provide removable bird screens, 1/2" mesh, 16-ga. aluminum or brass wire.


5. Motor Operated Dampers: Provide louvered dampers with linkage below curb base (maximum of 6").

6. Manufacturer: Subject to compliance with requirements, provide centrifugal roof ventilators of one of the following:
   a. Carnes Co., Div. of Wehr Corp.
   b. Cook Co., Loren.
   c. Greenheck Fan Corp.
   d. Penn Ventilator Co., Inc.
   e. Power Line Fans; Div. of Torin Corp.
   f. Or equal.

D. CENTRIFUGAL CEILING FANS (EF)
1. Provide AMCA Certified Ratings Seal.
2. Type: Provide galvanized steel housing lined with acoustical insulation, adaptable for ceiling or wall installation. Provide centrifugal fan wheels mounted on motor shaft with fan shrouds, all removable for service. Provide integral backdraft damper fan discharge.
3. Grille: Provide stainless steel or painted aluminum louvered grille with flange on intake with thumbscrew attachment to fan housing.
5. Electrical: Provide junction box for electrical connection on housing, and receptacle for motor plug-in.
   a. Furnish built-in fan speed control, for balancing purposes, of the solid state type capable of controlling fan speed from full speed to approximately half speed.
6. Accessories: Provide manufacturer's standard roof jack, wall cap, and transition fittings as indicted on drawings or schedules.
7. Manufacturer: Subject to compliance with requirements, provide centrifugal ceiling exhausters of one of the following:
   a. Carnes Co.
   b. Cook Co., Loren.
   c. ILG Industries.
   d. Penn Ventilator Co. Inc.
   e. Power Line Fans.
   f. Greenheck Fan Corp.
   g. Or equal.

E. PREFABRICATED ROOF CURBS
1. Manufacturer of ventilating unit shall provide his standard roof curb compatible with unit being provided. Curb shall be insulated and sloped to allow for level installation of device. Provide all necessary nailers, cants, etc. for a complete installation.
2.9 METAL DUCTWORK (Refer to Section 019113 Commissioning for additional contract requirements)

A. Ductwork Materials:
1. Exposed Ductwork Materials: Where ductwork is indicated to be exposed to view in occupied spaces, provide materials which are free from visual imperfections including piping, seam marks, roller marks, stains and discolorations, and other imperfections, including those which would impair painting.
2. Sheet Metal: Except as otherwise indicated, fabricate ductwork from galvanized sheet steel complying with ASTM A 527, lock forming quality, with G 90 zinc coating in accordance with ASTM A 525; and mill phosphatized for exposed locations.

B. Miscellaneous Ductwork Materials:
1. General: Provide miscellaneous materials and products of types and sizes indicated and, where not otherwise indicated, provide type and size required to comply with ductwork system requirements including proper connection of ductwork and equipment.
2. Fittings: Provide radius type fittings fabricated of multiple sections with maximum 15 degree change of direction per section. Unless specifically detailed otherwise, use 45 degree laterals and 45 degree elbows for branch takeoff connections. Where 90 degree branches are indicated, provide conical type tees.
3. Duct Liner: Refer to “Acoustic Duct Lining Section”.
5. Duct Liner Fasteners: Comply with SMACNA HVAC Duct construction Standards, Article S2.11.
6. Duct Sealant: Non-hardening, non-migrating mastic or liquid elastic sealant, type applicable for fabrication/installation details, as compounded and recommended by manufacturer specifically for sealing joints and seams in ductwork.
7. Ductwork Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim and angles for support of ductwork.
   a. For exposed stainless steel ductwork, provide matching stainless steel support materials.
   b. For aluminum ductwork, provide aluminum support materials except where materials are electrically separated from ductwork.
   a. Where installed in unconditioned spaces other than return air plenums, provide 1” thick continuous flexible fiberglass sheath with vinyl vapor barrier jacket.
C. Fabrication:
1. Shop fabricated ductwork in 4, 8, 10 or 12-ft lengths, unless otherwise indicated or required to complete runs. Pre-assembled work in shop to greatest extent possible, so as to minimize field assembly of systems. Disassemble systems only to extent necessary for shipping and handling. Match-mark sections for reassembly and coordinated installation.
2. Shop fabricated ductwork of gages and reinforcement complying with SMACNA "HVAC Duct Construction Standards".
3. Fabricate duct fittings to match adjoining ducts, and to comply with duct requirements as applicable to fittings. Except as otherwise indicated, fabricate elbows with center-line radius equal to 1-1/2 times associated duct width; or squared metered elbows with double thickness turning vanes. Limit angular tapers to 30 degrees for contracting tapers and 20 degrees for expanding tapers.
4. Fabricate ductwork with accessories installed during fabrication to the greatest extent possible. Refer to section "Ductwork Accessories" for accessory requirements.
5. Fabricate ductwork with duct liner in each section of duct where indicated. Laminate liner to internal surfaces of duct in accordance with instructions by manufacturers of lining and adhesive, and fasten with mechanical fasteners.

D. Factory-Fabricated Low Pressure Round And Oval Ductwork:
1. General: Provide factory-fabricated duct and fittings.
2. Material: Material type shall be as indicated or, galvanized sheet steel complying with ASTM A 527, lock forming quality, with ASTM A 525, G90 zinc coating, mill phosphatized.
4. Seams: All seams shall be spiral lockseams.
5. Elbows: One piece construction for 90 degrees and 45 degree elbows 14" and smaller. Provide multiple gore construction for larger diameters with standing seam circumferential joint.
6. Divided flow Fittings: 90 degree tees, constructed with saddle tap spot welded and bonded to duct fitting body.
7. Manufacturers: Subject to compliance with requirements, provide factory-fabricated ductwork of one of the following:
   a. Semco Mfg., Inc.
   b. United Sheet Metal Div., United McGill Corp.
   c. Or equal.
2.10 DUCTWORK ACCESSORIES (Refer to Section 019113 Commissioning for additional contract requirements)

A. Dampers:
1. Low Pressure Manual Dampers: Provide dampers of single blade type or multiblade type, constructed in accordance with SMACNA "HVAC Duct construction Standards".
2. Automatic Control Dampers: Refer to Division-23 section "Automatic Temperature Control" for control dampers; not work of this section.
3. Backdraft Relief Dampers: Provide dampers with parallel blades, counterbalanced and factory-set to relieve at 0.05" static pressure. Construct blades of 16-ga. aluminum, provide 1/2" diameter ball bearings, 1/2" diameter steel axles spaced on 9" centers. Construct from 2" x 1/2" x 1/8" steel channel for face areas 25 sq. ft. and under: 4" x 1-1/4" x 16 ga. channel for face areas over 25 sq. ft. Provide galvanized steel finish on frame with aluminum touch-up. Provide felted or rubber trim to assure tight, leak-proof seal when closed.
4. Manufacturer: Subject to compliance with requirements, provide dampers of one of the following:
   a. Air Balance, Inc.
   b. Airguarde Corp.
   c. American Warming & Ventilating, Inc.
   d. Arrow Louver and Damper; Div. of Arrow United Industries, Inc.
   e. Louvers & Dampers, Inc.
   f. Penn Ventilator Co.
   g. Ruskin Mfg. Co.
   h. Or equal.

B. Fire Dampers:
1. Fire Dampers: Provide fire dampers, of types and sizes indicated. Construct casings of 11-ga. galvanized steel. Provide fusible link rated at 160 to 165 degrees F (71 to 74 degrees C) unless otherwise indicated. Provide out of air stream type damper in open position and with positive lock in closed position, and with the following additional features:
   a. Damper Blade Assembly: Curtain type.
2. Manufacturer: Subject to compliance with requirements, provide fire and smoke dampers of one of the following:
   a. Air Balance, Inc.
   b. American Warming & Ventilating, Inc.
   c. Arrow Louver and Damper; Div. of Arrow United Industries, Inc.
   d. Louvers & Dampers, Inc.
   e. Penn Ventilator Co.
   f. Phillips-Aires
Turning Vanes:
1. Manufactured Turning Vanes: Provide double thickness airfoil turning vanes constructed of 1-1/2" wide curved blades set at 3/4" o.c., supported with bars perpendicular to blades set at 2" o.c, and set into side strips suitable for mounting in ductwork.
2. Manufacturer: Subject to compliance with requirements, provide turning vanes of one of the following:
   a. Aero Dyne Co.
   b. Airsan Corp.
   c. Anemostat Products Div.; Dynamics Corp. of America.
   d. Barber-Colman Co.
   e. Duro Dyne Corp.
   f. Environmental Elements Corp.; Subs, Koppers Co., Inc.
   h. Register & Grille Mfg. Co., Inc.
   i. Souther, Inc.
   j. Or equal.

Duct Hardware:
1. General: Provide duct hardware, manufactured by one manufacturer for all items on project, for the following:
   a. Test Holes: Provide in ductwork at fan inlet and outlet, and elsewhere as indicated, duct test holes, consisting of slot and cover, for instrument tests.
   b. Quadrant Locks: Provide for each damper, quadrant lock device on one end of shaft; and end bearing plate on other end for damper lengths over 12". Provide extended quadrant locks and end extended bearing plates for externally insulated ductwork.
2. Manufacturer: Subject to compliance with requirements, provide duct hardware of one of the following:
   a. Venttabrics, Inc.
   b. Young Regulator Co.
   c. Or equal.

Duct Access Doors:
1. General: Provide duct access doors of a size as required to service and maintain device in duct. Provide on (1) access door at each control damper, humidifier, coil, fire damper, and any device that requires attention.
2. Construction: Construct of same or greater gage as ductwork served, provide insulated doors for insulated ductwork. Provide flush frames for uninsulated ductwork, extended frames for externally insulated duct. Provide one side hinged, other side with one handle-type latch for doors 12" high and smaller, 2 handle-type latches for larger doors.
3. Manufacturer: Subject to compliance with requirements, provide duct access doors of one of the following:
   a. Air Balance, Inc.
   b. Duro Dyne Corp.
   c. Register & Grille Mfg. Co., Inc.
   e. Ventfabrics, Inc.
   g. Or equal.

F. Flexible Connectors:
   1. General: Provide flexible duct connections wherever ductwork connects to vibration isolated equipment. Construct flexible connections of neoprene-coated flameproof fabric crimped into duct flanges for attachment to duct and equipment. Make airtight joint. Provide adequate joint flexibility to allow for thermal, axial, transverse, and torsional movement, and also capable of absorbing vibration of connected equipment.
   2. Manufacturer: Subject to compliance with requirements, provide flexible connections of one of the following:
      b. Duro Dyne Corp.
      c. Flexaust (The) Co.
      d. Ventfabrics, Inc.
      e. Or equal.

2.11 AIR OUTLETS AND INLETS (Refer to Section 019113 Commissioning for additional contract requirements)

A. Ceiling Air Diffusers:
   1. General: Except as otherwise indicated, provide manufacturer's standard ceiling air diffusers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation. Stamped face diffusers will not be acceptable.
   2. Performance: Provide ceiling air diffusers that have, as minimum, temperature and velocity traverses, throw, drop and noise criteria ratings for each size device as listed in manufacturer's current data.
   3. Ceiling Compatibility: Provide diffusers with border styles that are compatible with adjacent ceiling systems, and that are specifically manufactured to fit into ceiling module with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems which will contain each type of ceiling air diffuser.
4. Types: Provide ceiling diffusers of type, capacity, throw, blow and with accessories as listed on diffuser schedule.
   a. Ceiling Diffusers shall be of the restricted multi-orificed jet induction and air mixing type consisting of louver sections with built-in diffusing vanes. The vanes shall be arranged to discharge air from adjacent louvers at an angle of 45 degrees in opposite directions to insure rapid mixing of primary and room air. Diffusing vanes shall be welded and mechanically fastened to the adjacent louver sections to make a rigid unit. The vanes shall extend to the discharge edges of the louvers. Where louver sections join the core frame, the louver ends shall be welded to the core frame. The leading edge of each louver shall be hemmed and the louver ends shall be rounded and hemmed before welding to the core frames.
   b. Diffusers shall be fabricated of aluminum or steel-welded construction, and shall be provided with a removable core permitting easy access to the neck connection. The diffuser neck shall extend no less than 1" above the core to accommodate an internal duct connection to prevent leakage into the ceiling space.
   c. Finish shall be baked enamel. Color as selected by A/E.

5. Diffuser Dampers:
   a. Opposed Blade: Adjustable opposed blade damper assembly, key operated from face of diffuser. Provide in each ceiling diffuser.

6. Manufacturer: Subject to compliance with requirements, provide diffusers of one of the following:
   a. Tuttle & Bailey Agitair Series
   b. Price
   c. Nailor
   d. Or equal

B. Wall Registers and Grilles:
1. General: Except as otherwise indicated, provide manufacturer's standard registers and grilles where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicted, and as required for complete installation.
2. Performance: Provide registers and grilles that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device and listed in manufacturer's current data.
3. Compatibility: Provide registers and grilles with border styles that are compatible with adjacent systems, and that are specifically manufactured to fit into wall and ceiling construction with accurate fit and adequate support. Refer to general construction drawings and specifications for types of construction which will contain each type of register and grille.
4. Types: Provide registers and grilles of type, capacity, and with accessories and finishes as listed on register and grille schedule.
5. Pattern: Register and grille patterns shall have style as identified on Drawings.
7. Accessories:
   a. Plaster Frame: Perimeter frame designed to act as plaster stop and register or grille anchor. Provide where required.
   b. Operating Keys: Tools designed to fit through register or grille face and operate volume control device and/or pattern adjustment.
8. Finish: Register and Grille Finishes shall be baked enamel color as selected by the Architect.
9. Manufacturer: Subject to compliance with requirements, provide registers and grilles of one the following:
   a. Agitair (Air Devices)
   b. Price
   c. Nailor
   d. Or equal

C. Ceiling Registers and Grilles:
1. General: Except as otherwise indicated, provide manufacturer's standard "Egg-Crate" type registers and grilles where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.
2. Compatibility: Provide registers and ceiling grilles with border styles that are compatible with adjacent ceiling systems, and that are specifically manufactured to fit into ceiling construction with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling construction.
3. Types: Provide registers and grilles of type, capacity, and with accessories and finishes as listed on register and grille schedule.
4. Register and Grille Materials:
   a. Aluminum Construction: Manufacturer's standard extruded aluminum frame and core.
5. Register and Grille Faces:
   a. 1/2" x 1/2" "Egg-Crate" with 1" border frame.
6. Register and Grille Dampers:
   a. Opposed Blade: Adjustable opposed blade damper assembly, key operated from face of register (provide for registers only).
7. Register and Grille Finishes shall be baked enamel color as selected by the Architect.
8. Manufacturer: Subject to compliance with requirements, provide registers and grilles of one of the following:
   a. Agitair (Air Devices)
   b. Price
c. Nailor

d. Or equal

2.12 WALL AND CEILING ACCESS DOORS

A. Furnish access doors for access to all concealed control valves, motor operated dampers, fire doors, etc, and all other concealed parts of the HVAC system that require accessibility for the proper operation and maintenance of the system.

B. Access doors shall be heavy gage steel with 1" frame. Door shall be fastened to frame with continuous piano hinge. Entire door and frame assembly shall be prime painted and be completed with cylinder lock and two (2) keys. Door and frame shall match fire rating of wall or ceiling installed into.

C. Manufacturer: Subject to compliance with requirements, provide access doors of one of the following:
   1. Inland Steel Products Company, "Milcor"
   2. Walsh-Hannon-Gladwin Inc., "Way Loctor"

2.13 AUTOMATIC TEMPERATURE CONTROLS ELECTRIC/ELECTRONIC

A. General: Provide electric/electronic control products in sizes and capacities indicated, consisting of valves, dampers, thermostats, clocks, sensors, controllers, and other components as required for a complete installation. Except as otherwise indicated, provide manufacturer's standard control system components as indicated by published product information, designed and constructed as recommended by manufacturer. All equipment and systems shall be installed by factory trained, certified, and authorized technicians. Provide electric/electronic control systems with following functional and construction features as indicated.

B. The following incidental work shall be furnished by the designated contractor under the supervision of the control contractor.
   1. The HVAC Contractor shall:
      a. Install automatic valves and separable wells that are specified to be supplied by the control contractor.
      b. Furnish and install all necessary valved pressure taps, water, drain and overflow connections and piping.
      c. Provide, on magnetic starters furnished, all necessary auxiliary contacts, with buttons and switches in the required configurations.
   2. The sheet metal contractor shall:
      a. Install all automatic dampers.
      b. Provide necessary blank-off plates (safing) required to install dampers that are smaller than duct size.
      c. Assemble multiple section dampers with required interconnecting linkages and extend required number of shafts through duct for external mounting of damper motors.
d. Provide necessary sheet metal baffle plates to eliminate stratification and provide air volumes specified. Locate baffles by experimentation and affix and seal permanently in place only after stratification problem has been eliminated.

e. Provide access doors at each automatic damper control equipment.

f. Install duct smoke detectors.

C. Electric Wiring:

1. All electric wiring and wiring connections, either line voltage or low voltage, from the main electric panels to the ATC panels, and from the ATC related panels to the individual control devices i.e. valves, dampers, etc. required for the installation of the control system, as herein specified, shall be provided by the 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 in occupied areas 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. All wiring located in mechanical spaces, boiler rooms, fan rooms, etc. shall be installed in metal conduit.

2. All wiring above ceilings, in boiler rooms, and all mechanical spaces shall follow routing of piping and where not possible shall be in conduit. All exposed wire shall be bundled and wire tied and shall be supported to adjacent piping. Draped and free floating wire will not be allowed.

3. All terminations of wire at control devices shall be looped and supported adequately.

4. All wiring shall comply with the requirements of the electrical section of the specification.

D. Control Valves: Provide factory-fabricated electrical control valves of type, body material and pressure class indicated. Where type or body material is not indicated, provide selection as determined by manufacturer for installation requirements and pressure class, based on maximum pressure and temperature rating of piping system. Except as otherwise indicated, provide valves which mate and match material of connecting piping. Equip control valves with control valve motors and with proper shutoff ratings for each individual application.

1. Water Service Valves: Equal percentage characteristics with rangeability of 50 to 1, and maximum full flow pressure drop of 3 psig.

2. Single-Seated Valves: Cage type trim, providing seating and guiding surfaces for plug on "top and bottom" guided plugs.

3. Double-Seated Valves: Balanced plug-type, with cage type trim providing seating and guiding surfaces for plugs on "top and bottom" guided plugs.

6. Terminal Unit Control Valves: Provide control valves for control of terminal units including, but not necessarily limited to, convectors, finned tube radiation, and reheat coil units that are of integral motor type. Provide 2 position or modulating type valves (as required in sequence of operation) electrically actuated.

E. Dampers: Provide automatic control dampers as indicated, with damper frames not less than formed 13-ga galvanized steel. Provide mounting holes for enclosed duct mounting. Provide damper blades not less than formed 16-ga galvanized steel, with maximum blade width of 8". Equip dampers with motors, with proper rating for each application.
1. Secure blades to ½" diameter zinc-plated axles using zinc-hardware. Seal off against spring stainless steel blade bearings. Provide blade bearings of nylon and provide thrust bearings at each end of every blade. Construct blade linkage hardware of zinc-plated steel and brass. Submit leakage and flow characteristics, plus size schedule for controlled dampers.
2. Operating Temperature Range: From -20 degrees to 200 degrees F (-29 degrees to 93 degrees C).
3. Provide parallel or opposed blade design (as selected by manufacturer's sizing techniques) with inflatable seal blade edging, or replaceable rubber seals, rated for leakage at less than 10 CFM sq. ft. of damper area, at differential pressure of 4" w.g. when damper is being held by torque of 50 inch-pounds.
4. Provide unit ventilator outside air dampers with adjustable minimum settings (indicated on schedule) so that ventilation can be adjusted for each space or room.

F. Room Thermostats: (Appropriate thermostat determined by Sequence of Operation). Provide room thermostats with locking covers and with concealed or easily-accessible adjustment devices and dead band as indicated.
1. Line-Voltage On-Off Thermostats: Provide thermostats of bi-metal actuated open contact, or bellows actuated enclosed snap-switch type, or equivalent solid-state type; UL-Listed at electrical rating comparable with application. Provide bimetal thermostats which employ heat anticipation. Equip thermostats which control electric heating loads directly, with “Off” position on dial wired to break ungrounded conductors.
2. Low Voltage On-Off Thermostats: Comply with general requirement indicated for line-voltage thermostats. Provide thermostats of bimetal operated mercury-switch type, with either adjustable or fixed universal anticipation heater.
3. Low-Voltage Modulating Thermostats: Provide potentiometer type, operated by vapor-filled bellows.
G. Low-Temperature Protection Thermostats (Freezestat): Provide low-temperature protection thermostats of manual-reset type, with sensing elements 8'-0" or 20'-0" in length. Provide thermostat designed to operate in response to coldest 1'-0" length of sensing element, regardless of temperature at other parts of element. Support element properly to cover entire duct width. Provide separate thermostats for each 25 sq. ft. of coil face area or fraction thereof. Provide on all AHU, classroom unit ventilators and all other coils subject to receiving outside air at any quantity.

H. Clocks: Provide electronic time clocks specified as part of temperature control sequences, of 7-day, 24-hour type, with weekend or skip-a-day features. Equip time clocks with battery back-up to maintain time schedule in case of power failure.

I. Step Controllers: Provide step controllers for control sequencing or for control of electric heat power loads, of 6 or 10-stage type, with heavy-duty switching rated to handle loads, UL-Listed and operated by electric motors of quality specified for valve and damper actuation.

J. Electronic Sensors: Provide electronic temperature and relative humidity sensors of supersensitive resistance type, which are vibration and corrosion-resistant, and of wall mounted immersion, duct mounting, averaging or bulb type as required for application.

K. Damper and Valve Actuators: Provide direct or reverse acting proportional low voltage (24V) control (refer to sequence of operation). Units shall be provided with an integral helical spring to return motor shaft to normal position. Motor and gear train shall be oil-immersed. Select actuator to produce smooth unobstructed movement in a 30 to 60 second timing stroke.
   1. Provide two-way and three-way, two position and modulating damper and valve actuators as required in the sequence of operation.
   2. Equip motors for outdoor locations and for outside air intakes with "O ring" gaskets designed to make motors completely weatherproof, and equip with internal heaters to permit normal operation at -40 degrees F (-40 degrees C).
   3. Furnish non-spring return motors for dampers larger than 25 sq. ft., and for valves larger than 2-1/2", sized for running torque rating of 150 inch-pounds, and breakaway torque rating of 300 inch-pounds. Size spring-return motors for running torque rating 150 inch-pounds, and breakaway torque rating of 150 inch-pounds.
L. Electric Contactors: Provide contactors for operating or limit-control of electric heating loads which are UL-Listed for 100,000 cycles of resistive loads. Equip with replaceable molded coils and replaceable silver cadmium oxide contacts. Coat core laminations with heat-resistant inorganic film to reduce core losses. Provide line and load terminals on contactors with higher-than-35-amp rating, or provide one piece formed-and-welded pressure type. Provide screw-type contactors for 35-amp-or-lower rating. Equip field-mounted contactors with suitable steel enclosures; and provide open type mounting for those installed in factory-fabricated panels.

M. Water Flow Switches: Provide water flow switches of stainless steel or bronze paddle types. Provide pressure flow switches of bellows actuated mercury type or snap-acting type, with appropriate scale range and differential adjustment for service indicated.

N. Energy Recovery Unit Control Panels: Provide control panels with suitable brackets for either wall or floor mounting, for each supply fan and return system. Locate panel where shown on the drawings.

   1. Provide standard steel cabinets as required to contain temperature controllers, relays, switches, and similar devices, except limit controllers and other devices excluded in sequence of operations. Provide full enclosure cabinets, with painted gray finish.

O. Pump Panel: Provide manufacturer’s standard steel panel with suitable wall mounting bracket. Panel shall contain automatic alternator selector, test button, and operating light for each pump.

P. RTU and Boiler System Control Panels: Provide control panels with suitable brackets for either wall or floor mounting, for each supply fan system. Locate panel where shown on the drawings.

   1. Provide standard steel cabinets as required to contain temperature controllers, relays, switches, and similar devices, except limit controllers and other devices excluded in sequence of operations. Provide full enclosure cabinets, with painted gray finish.

Q. Touch screen interface:

   1. Provide color LCD touch screen interface for building control system.
   2. Touch panel shall allow operators to monitor and control building HVAC systems.
   3. System shall be expandable for future connection to a building management system via BACNet MS/TP.
   4. System shall allow operators to control and adjust HVAC system schedules and setpoints.
   5. System shall be as manufactured by Delta Controls Entelitouch or equal.

R. Sequence of Operations:

   1. Refer to HVAC Control Diagram Drawings.
S. Manufacturer: Subject to compliance with requirements, provide electric control systems of one of the following:
1. Delta
2. Honeywell
3. Johnson
4. Allerton
5. Or Equal

PART 3 - EXECUTION

3.1 ATTIC STOCK
A. Rooftop Units, Air Handling Units, Heating & Ventilating Units, & Energy Recovery Ventilators
   1. Four additional complete extra sets of pre and final filters for each RTU/ERV/HV/AHU for attic stock. All these filters indicated above including the four sets of attic stock are additional to those provided for flush out and indoor air quality requirements per LEED requirements.
   2. Provide one spare set of belts for each belt-driven air handling unit.
   3. Obtain receipt from Owner that attic stock provided.
B. Power and Gravity Ventilators
   1. Furnish to Owner, with receipt, one spare set of belts for each belt driven power ventilator
C. Ductwork Accessories
   1. Furnish extra fusible links to owner, one link for every 10 installed of each temperature range; obtain receipt.
D. Ductless Cooling Units
   1. Furnish to Owner, with receipt, (2) spare sets of filters per each indoor unit.

3.2 INSTALLATION OF HANGERS AND ATTACHMENTS
A. Examine areas and conditions under which supports and anchors are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.
B. Proceed with installation of hangers, supports and anchors only after required building structural work has been completed in areas where the work is to be installed. Correct inadequacies including (but not limited to) proper placement of inserts, anchors, and other building structural attachments.
C. Prior to installation of hangers, supports, anchors, and associated work, Installer shall meet at project site with Contractor, installer of each component of associated work, inspection and testing agency representatives (if any), installers of other work requiring coordination with work of this section and Architect/Engineer for purposes of reviewing material selections and procedures to be followed in performing the work in compliance with requirements specified.
D. Install building attachments at required locations within concrete or on structural steel for proper piping support. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten insert securely to forms. Where concrete with compressive strength less than 2500 psi is indicated, install reinforcing bars through the openings at the tops of inserts.

E. Install hangers, supports, clamps, and attachments to support piping properly from building structure; comply with MSS SP-69. Arrange for grouping of parallel runs of horizontal piping to be supported together on trapeze type hangers where possible. Install supports with maximum spacing complying with MSS SP-69. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping, and do not support piping from other piping.

1. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories. Except as otherwise indicated for exposed continuous pipe runs, install hangers and supports of same type and style as installed for adjacent similar piping.

2. Prevent electrolysis in support of copper tubing by the use of hangers and supports which are copper plated, or by other recognized industry methods.

3. Install hangers and supports to allow controlled movement of piping systems and to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

4. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.

5. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes, and so that maximum pipe deflections allowed by ANSI B31 Pressure Piping Codes are not exceeded.

6. Insulated Piping: Comply with the following installation requirements:
   a. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ANSI B31.
   b. Shields: For pipe sizes up to and including 4” provide heavy gage shield at each hanger point.
   c. Saddles: For all pipe sizes over 4” provide saddle at each hanger point. Completely fill void in saddle with loose insulation.

F. Install anchors at proper locations to prevent stresses from exceeding those permitted by ANSI B31, and to prevent transfer for loading and stresses to connected equipment.
G. Fabricate and install anchor by welding steel shapes, plates, and bars to piping and to structure. Comply with ANSI B31 and with AWS standards.

H. Where expansion compensators are indicated, install anchors in accordance with expansion unit manufacturer’s written instructions, to limit movement of piping and forces to maximums recommended by manufacturer for each unit.

I. Anchor Spacings: Where not otherwise indicated, install anchors at ends of principal pipe-runs, at intermediate points in pipe-runs between expansion loops and bends. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

J. Provide concrete housekeeping bases for all floor-mounted equipment. Size bases to extend minimum of 4” beyond equipment base in any direction; and 4” above finished floor elevation. Construct of reinforced concrete, roughen floor slab beneath base for bond, and provide steel rod anchors between floor and base. Locate anchor bolts using equipment manufacturer’s templates. Chamfer top and edge corners.

K. Provide structural steel stands to support equipment not floor mounted or hung from structure. Construct of structural steel members or steel pipe and fittings. Provide factory-fabricated tank saddles for tanks mounted on steel stands.

L. Adjusting and Cleaning:
   1. Hanger Adjustment: Adjust hangers so as to distribute loads equally on attachments.
   2. Support Adjustment: Provide grout under supports so as to bring piping and equipment to proper level and elevations.
   3. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer’s touch-up paint.

3.3 INSTALLATION OF MECHANICAL IDENTIFICATION

A. Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.

B. Mechanical Equipment Identification:
   1. General: Install engraved plastic laminate sign or plastic equipment marker on or near each major item of mechanical equipment and each operational device, as specified herein if not otherwise specified for each item or device.
   2. Lettering Size: Minimum 1/4” high lettering for name of unit where viewing distance is less than 2' - 0", 1\2" high for distances up to 6' - 0", and proportionately larger lettering for greater distances. Provide secondary lettering of 2/3 to 3/4 of size of the principal lettering.
C. Adjusting and Cleaning:
1. Adjusting: Relocate any mechanical identification device which has become visually blocked by work of this division or other divisions.
2. Cleaning: Clean face of identification devices, and glass frames of valve charts.

3.4 INSTALLATION OF MECHANICAL INSULATION

A. Installation of Piping Insulation:
1. General: Install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.
2. Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full-length units of insulation, with a single cut piece to complete run. Do not use cut pieces or scraps abutting each other.
3. Clean and dry pipe surfaces prior to insulating. Butt installation joints firmly together to ensure a complete and tight fit over surfaces to be covered.
4. Maintain integrity of vapor-barrier jackets on pipe insulation, and protect to prevent puncture or other damage.
5. Cover valves, fittings and similar items in each piping system with equivalent thickness and composition of insulation as applied to adjoining pipe run. Install factory molded, precut or job fabricated units (at Installer's option) except where specific form or type is indicated.
6. Extend piping insulation without interruption through walls, floors and similar piping penetrations, except where otherwise indicated.
7. Butt pipe insulation against pipe hanger insulation inserts. For hot pipes, apply 3" wide vapor barrier tape or band over the butt joints. For cold piping apply wet coat of vapor barrier lap cement on butt joints and seal joints with 3" wide vapor barrier tape or band.

B. Installation of Ductwork Insulation:
1. General: Install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.
2. Install insulation materials with smooth and even surfaces.
3. Clean and dry ductwork prior to insulating. Butt insulation joints firmly together to ensure complete and tight fit over surfaces to be covered.
4. Maintain integrity of vapor-barrier on ductwork insulation, and protect it to prevent puncture and other damage.
5. Extend ductwork insulation without interruption through walls, floors and similar ductwork penetrations, except where otherwise indicated.
6. Lined Ductwork: Except as otherwise indicated, omit insulation on ductwork where internal insulation or sound absorbing linings have been installed.
C. Protection and Replacement:
   1. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.
   2. Protection: Insulation Installer shall advise Contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.

3.5 INSTALLATION OF REFRIGERANT PIPING AND ACCESSORIES

A. Vibration Control and Seismic Restraint: Refer to SECTION 23 05 48 and drawings VS.1 & VS.2 for the appropriate support of each piece of HVAC equipment noted as requiring such. The vibration control and seismic restraint manufacturer shall recommend the correct connection and device as outlined in SECTION 23 05 48 and drawings VS.1 & VS.2.

B. Piping Installations:
   1. Locations and Arrangements: Drawings indicate the general location and arrangement of piping systems. Locations and arrangements of piping take into consideration pipe sizing and friction loss, and other design consideration. So far as practical, install piping as indicated.
   2. Install pipe sleeves at all wall and floor penetrations.
   3. Install escutcheons at all exposed pipe wall penetrations.

3.6 INSTALLATION OF DUCTLESS COOLING UNIT SYSTEMS

A. Vibration Control and Seismic Restraint: Refer to SECTION 23 05 48 and drawings VS.1 & VS.2, for the appropriate support of each piece of HVAC equipment noted as requiring such. The vibration control and seismic restraint manufacturer shall recommend the correct connection and device as outlined in SECTION 23 05 48 and drawings VS.1 & VS.2.

B. General:
   1. Verify all dimensions by field measurements. Verify roof structure, mounting supports, wall structure, and membrane installations are completed to the proper point to allow installation of wall mounted and roof mounted units. Examine rough-in for refrigerant piping systems to verify actual locations of piping connections prior to installation. Do not proceed until unsatisfactory conditions have been corrected.
   2. Install equipment in accordance with manufacturer’s installation instructions. Install units plumb and level, firmly anchored in locations indicated, and maintain manufacturer’s recommended clearances.

C. Field Quality Control:
   1. Provide the services, to include a written report, of a factory authorized service representative to examine the field assembly of the components, installation, and piping and electrical connections.
   2. Charge systems with refrigerant and oil, and test for leaks. Repair leaks and replace lost refrigerant and oil.
D. Demonstration:
   1. Provide the services of a factory authorized service representative to provide start-up service and to demonstrate and train the Owner's maintenance personnel as specified below.
   2. Start-up service: Place units into operation and adjust controls and safeties. Replace damaged or malfunctioning components and controls.

E. Training:
   1. Train the Owner's maintenance personnel on start-up and shut-down procedures, troubleshooting procedures, and servicing and preventative maintenance schedules and procedures.
   2. Schedule training with Owner through the Architect/Engineer with at least 7 days prior notice.

3.7 INSTALLATION OF ROOFTOP UNITS WITH ENERGY RECOVERY

A. Vibration Control and Seismic Restraint: Refer to section 230548 and drawings VS.1 & VS.2 for the appropriate support of each piece of HVAC equipment noted as requiring such. The vibration control and seismic restraint manufacturer shall recommend the correct connection and device as outlined in section 230548 and drawings VS.1 & VS.2.

B. General: Install rooftop units in accordance with manufacturer's installation instructions. Install units plumb and level, firmly anchored in location indicated, and maintain manufacturer's recommended clearances.

C. Support: The roofing contractor shall install and secure roof curb to roof structure, per details on the drawings and in accordance with National Roofing Contractors Association (NRCA) installation recommendations and shop drawings. Install and secure rooftop units on curbs and coordinate roof penetrations and flashing.

D. Electrical Connections: Refer to electrical sections for final connections to equipment and installation of loose shipped electrical components.

E. Start-Up Services:
   1. Provide the services of a factory-authorized service representative to start-up rooftop units, in accordance with manufacturer's written start-up instructions. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.

F. Operating and Maintenance Training:
   1. Provide services of manufacturer's service representative to instruct Owner's personnel in operation and maintenance of rooftop units. Training shall include start-up and shut-down, servicing and preventative maintenance schedule and procedures, and troubleshooting procedures plus procedures for obtaining repair parts and technical assistance.
2. Schedule training with Owner, provide at least 7-day prior notice to the Architect/Engineer.

3.8 INSTALLATION OF POWER AND GRAVITY VENTILATORS

A. Vibration Control and Seismic Restraint: Refer to SECTION 23 05 48 and drawings VS.1 & VS.2 for the appropriate support of each piece of HVAC equipment noted as requiring such. The vibration control and seismic restraint manufacturer shall recommend the correct connection and device as outlined in SECTION 23 05 48 and drawings VS.1 & VS.2.

B. General: Except as otherwise indicated or specified, install ventilators in accordance with manufacturer's installation instructions and recognized industry practices to insure that products serve the intended function.

C. Coordinate ventilator work with work of roofing, walls and ceilings, as necessary for proper interfacing.

D. Ductwork: Connect ducts to ventilators in accordance with manufacturer's installation instruction, and details on drawings.

E. Roof Curbs: Furnish roof curbs to roofing Installer for installation.

F. Electrical Wiring: Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to Electrical Installer.
   1. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division-26 sections. Verify proper rotation direction of fan wheels. Do not proceed with equipment start-up until wiring installation is acceptable to equipment installer.

G. Remove shipping bolts and temporary supports within ventilators. Adjust dampers for free operation.

H. Testing: After installation of ventilators has been completed, test each ventilator to demonstrate proper operation of unit at performance requirements specified. When possible, field correct malfunctioning units, then retest to demonstrate compliance. Replace units which cannot be satisfactorily corrected.

I. Cleaning: Clean factory-finished surface. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

J. General: Furnish to Owner, with receipt, one spare set of belts for each belt driven power ventilator.
3.9 INSTALLATION OF METAL DUCTWORK

A. Installation of Metal Ductwork:
   1. General: Assemble and install ductwork in accordance with recognized industry practices which will achieve air-tight (5% leakage for systems rated 3" and under; 1% for systems rated over 3") and noiseless (no objectionable noise) systems, capable of performing each indicated service. Install each run with minimum number of joints. Align ductwork accurately with internal surface smooth. Support ducts rigidly with suitable ties, braces, hangers and anchors of type which will hold ducts true-to-shape and to prevent buckling. Support vertical ducts at every floor.
   2. Sealing: All ductwork joints and seams shall be sealed with flexible duct sealer to assure an airtight installation.
   3. Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same gage as duct. Overlap opening on 4 sides by at least 1-1/2". Fasten to duct and substrate.
      a. Where ducts pass through fire-rated floors, walls, or partitions, provide firestopping between duct and substrate.
   4. Coordination: Coordinate duct installation with installation of accessories, dampers, coil frames, equipment, controls and other associated work of ductwork system.
   5. Installation: Install metal ductwork in accordance with "SMACNA HVAC Duct Construction Standards".

B. Installation of Duct Liners:
   1. General Install duct liners in accordance with SMACNA "HVAC Duct Construction Standards".

C. Installation of Flexible Ducts:
   1. Maximum Length: For any duct run using flexible ductwork, do not exceed 4'-0" extended length.
   2. Installation: Install in accordance with Section II of SMACNA's, "HVAC Duct Construction Standards, Metal and Flexible".

D. Field Quality Control:
   1. Leakage Tests: After each duct system, which is constructed for duct classes over 3" is completed, test for duct leakage in accordance with SMACNA "HVAC Air Duct Leakage Test Manual". Repair leaks and repeat tests until total leakage is less than 1% of system design air flow.
E. Equipment Connections:
   1. General: Connect metal ductwork to equipment as indicated, provide flexible connection for each ductwork connection to equipment mounted on vibration isolators, and/or equipment containing rotating machinery.

F. Adjusting and Cleaning:
   1. Clean ductwork internally, unit by unit as it is installed, of dust and debris. Clean external surfaces of foreign substances which might cause corrosive deterioration of metal or, where ductwork is to be painted, might interfere with painting or cause paint deterioration.
   2. Temporary Closure: At ends of ducts which are not connected to equipment or air distribution devices at time of ductwork installation, provide temporary closure of polyethylene film or other covering which will prevent entrance of dust and debris until final connections are to be completed.
   3. Balancing: Refer to Division 23 section "Testing, Adjusting, and Balancing" for air distribution balancing of metal ductwork. Seal any leaks in ductwork that become apparent in balancing process.

3.10 INSTALLATION OF DUCTWORK ACCESSORIES

A. Install ductwork accessories in accordance with manufacturer's installation instructions, with applicable portions of details of construction as shown in SMACNA standards, and in accordance with recognized industry practices to ensure that products serve intended function.

B. Install turning vanes in square or rectangular 90 degree elbows in supply, return, and exhaust air systems, and elsewhere as indicated.

C. Install splitter damper with adjusting rod in each supply branch. Install according to detail on drawings.

D. Install access doors to open against system air pressure, with latches operable from either side, except outside only where duct is too small for person to enter.

E. Operate installed ductwork accessories to demonstrate compliance with requirements. Test for air leakage while system is operating. Repair or replace faulty accessories, as required to obtain proper operation and leak proof performance.

F. Adjusting: Adjust ductwork accessories for proper settings, install fusible links in fire dampers and adjust for proper action.

G. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.
H. Furnish extra fusible links to owner, one link for every 10 installed of each temperature range; obtain receipt.

3.11 INSTALLATION OF AIR OUTLETS AND INLETS

A. General: Install air outlets and inlets in accordance with manufacturer's written instructions and in accordance with recognized industry practices to insure that products serve intended function.

B. Locate ceiling air diffusers, registers, and grilles, as indicated on general construction "Reflected Ceiling Plans". Unless otherwise indicated, locate units in center of acoustical ceiling module.

3.12 INSTALLATION OF WALL AND CEILING ACCESS DOORS

A. General: Install access doors in accordance with manufacturer's written instructions and in accordance with recognized industry practices to insure that products serve intended function.

B. All access doors shall be located in a workmanlike manner in closets, storage rooms, and/or other non-public areas, positioned so that the item or part can be easily reached, and the size shall be sufficient for this purpose (minimum size 12" X 16"). Furnish access doors to permit thorough inspection. When access doors are required in corridors, lobbies, or other habitable areas, they shall be located as directed by the Architect.

3.13 INSTALLATION OF VEHICLE EXHAUST CAPTURE SYSTEM

A. General:
1. Install systems and materials in accordance with manufacturer's instructions, roughing-in drawings and details shown on drawings.
2. Install winch, hoisting cables, and related field installed accessories per manufacturer's recommendations.

B. Adjusting and Cleaning:
1. Test and adjust systems in presence of manufacturer's authorized representative. Demonstrate compliance with requirements. Replace damaged or malfunctioning equipment.
2. Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

C. Closeout Procedures:
1. Owner's Instructions: Provide services of manufacturer's technical representative for one 2-hour day to instruct Owner's personnel in operation and maintenance of systems.
3.14 INSTALLATION OF AUTOMATIC TEMPERATURE CONTROLS ELECTRIC/ELECTRONIC

A. Inspection:
   1. Examine areas and conditions under which electric/electronic control systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

B. Installation of Electric/Electronic Control Systems:
   1. General: Install systems and materials in accordance with manufacturer's instructions and roughing in drawings, and details on drawings. Install electrical components and use electrical products complying with requirements of applicable Division-26 sections of these specifications. Mount controllers at convenient locations and heights.
   2. Control Wiring: The term "control wiring" is defined to include providing of wire, conduit and miscellaneous materials as required for mounting and connecting electric control devices.
   3. Wiring Systems: Install complete control wiring system for electric control systems. Conceal wiring except in mechanical rooms and areas where other conduit and piping are exposed. Provide multi-conductor instrument harness (bundle) in place of single conductors where number of conductors can be run along common path. Fasten flexible conductors bridging cabinets and doors, neatly along hinge side, and protect against abrasion. Tie and support conductors neatly.
   4. Number code or color-code conductors, excluding those used for local individual room controls, appropriately for future identification and servicing of control system.
   5. Reset Limit Controls: Install manual reset limit controls to be independent of power controllers' automatic duct heater resets may, at Contractor's option, be installed in interlock circuit of power controllers.
   6. Unit Mounted Equipment: Where control devices are indicated to be unit mounted, ship electric relays, electric switches, valves, dampers, and damper motors to limit manufacturer for mounting and wiring at factory.

C. Adjusting and Cleaning:
   1. Start-up: Start-up, test, and adjust electric control systems in presence of manufacturer's authorized representative. Demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.
   2. Cleaning: Clean factory finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.
   3. Final Adjustment: After completion of installation, adjust thermostats, control valves, motors and similar equipment provided as work of this section.
a. Final adjustment shall be performed by specially trained personnel in direct employ of manufacturer of primary temperature control system.

D. Closeout Procedures:
   1. Owner's Instructions: Provide services of manufacturer's technical representative for one 8-hour day to instruct Owner's personnel in operation and maintenance of electric control systems.
      a. Schedule instruction with Owner; provide at least 7-day notice to Contractor and Engineer of training.

3.15 TESTING, ADJUSTING, AND BALANCING

A. Requirements:
   1. Requirements include measurement and establishment of the fluid quantities of the mechanical systems as required to meet specifications, and recording and reporting the results.
   2. Test, adjust and balance the following mechanical systems:
      a. Supply air systems.
      b. Return air systems.
      c. Exhaust air systems.
      d. Outside air systems.
      e. Verify temperature control system operation.
   3. Do not include:
      a. Testing boilers and pressure vessels for compliance with safety code.
      b. Installation of adjusting and balancing devices. If devices must be added to achieve proper adjusting and balancing. Contact Mechanical Contractor and the Engineer for direction.

B. Report:
   1. Format: Report forms shall be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted, and balanced. Bind report forms complete with schematic systems diagrams and other data in reinforced, vinyl, three-ring binders. Provide binding edge labels with the project identification and a title descriptive of the contents. Divide the contents of the binder into the below listed divisions, separated by divider tabs:
      a. General Information and Summary.
      b. Air Systems.
      c. Temperature Control Systems.
2. Contents: Provide the following minimum information, forms and data:
   a. General Information and Summary: Inside cover sheet to identify testing, adjusting, and balancing agency, Contractor, Owner, Architect, Engineer, and Project. Include addresses, and contact names and telephone numbers. Also include a certification sheet containing the seal and name address, telephone number, and signature of the Certified Test and Balance Engineer. Include in this division a listing of the instrumentation used for the procedures along with the proof of calibration.
   b. The remainder of the report shall contain the appropriate forms containing as a minimum, the information indicated on the standard report forms prepared by the AABC for each respective item and system.
   c. Submit proof that all required instrumentation has been calibrated to tolerances specified in the referenced standards, within a period of six months prior to starting the project.

C. Quality Assurance:
   1. An independent testing, adjusting, and balancing agency certified by the AABC or NEBB as a Test and Balance Engineer in those testing and balancing disciplines required for this project.
   2. Codes and Standards:
      a. AABC: "National Standards For Total System Balance".
   3. Pre-Balancing Conference: Prior to beginning of the testing, adjusting, and balancing procedures, schedule and conduct a conference with the Architect/Engineer and Mechanical Contractor. The objective of the conference is final coordination and verification of system operation and readiness for testing, adjusting, and balancing.
   4. System Operation: Systems shall be fully operational prior to beginning procedures. All new automatic temperature controls shall be fully operational. Test, adjust and balance the air systems before refrigerant systems. Test, adjust and balance air conditioning systems during summer season, and heating systems during winter season, including at least a period of operation at outside conditions within 5° F. wet bulb temperature of maximum summer design condition, and within 10° F. dry bulb temperature of minimum winter design condition. Take final temperature reading during seasonal operation.
D. Preliminary Procedures:

1. Air Systems:
   a. Obtain drawings and become thoroughly acquainted with the systems.
   b. Compare drawings to installed equipment and field installations.
   c. Walk the system from the system air handling equipment to terminal units to determine variations in installation.
   d. Check filters for cleanliness.
   e. Check all dampers (volume and fire) for correct and locked position, and temperature control for completeness of installation before starting fans.
   f. Prepare report test sheets for both fans and outlets. Obtain manufacturer’s outlet factors and recommended procedures for testing. Prepare a summation of required outlet volumes to permit a cross check with required fan volumes.
   g. Determine best locations in main and branch ductwork for most accurate duct traverses. Traverses shall be performed in each supply and return duct main and sub-mains for each AHU and return air fan.
   h. Place outlet dampers in the full open position.
   i. Prepare schematic diagrams of system "as-built" ductwork and piping layouts to facilitate reporting.
   j. Verify lubrication of all motors and bearings.
   k. Check fan belt tension.
   l. Check fan rotation.

2. Measurements:
   a. Provide all required instrumentation to obtain proper measurements, calibrated to the tolerance specified in the referenced standards. Instruments shall be properly maintained and protected against damage.
   b. Provide instruments meeting the specifications of the referenced standards.
   c. Use only those instruments which have the maximum field measuring accuracy and are best suited to the function being measured.
   d. Apply instrument as recommended by the manufacturer.
   e. Use instruments with minimum scale and maximum subdivisions and with scaled ranges proper for the value being measured.
   f. When averaging values, take a sufficient quantity of readings which will result in a repeatability error of less than 5%. When measuring a single point, repeat readings until 2 consecutive identical values are obtained.
   g. Take all reading with the eye at the level of the indicated value to prevent parallax.

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h. Use pulsation dampeners where necessary to eliminate error involved in estimating average of rapidly fluctuation readings.

i. Take measurements in the system where best suited to the task.

E. Performing Testing, Adjusting, and Balancing:

1. Test, adjust and balance all noted systems according to SMACNA standards and as follows:
   a. Perform testing and balancing procedures on each system identified, in accordance with the detailed procedures outlined in the referenced standards.
   b. Cut insulation and ductwork for installation of test probes to the minimum extent necessary to allow adequate performance of procedures.
   c. Patch insulation, ductwork, and housings, using materials identical to those removed.
   d. Seal ducts and test for and repair leaks.
   e. Seal insulation to re-establish integrity of the vapor barrier.
   f. Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings. Mark with paint or other suitable, permanent identification materials.
   g. Retest, adjust and balance system subsequent to significant system modifications, and resubmit test results.

2. System Deficiencies:
   a. The Balancing Contractor shall advise the Mechanical Contractor and the Engineer of all system deficiencies in writing. Report all motors not running, missing dampers, inoperative valves and controls, lack of access, etc.
   b. Upon completion of system deficiencies, Balancing Contractor shall balance and record data.

END OF SECTION
PART 1 - GENERAL

1.1 DESCRIPTION 
1.2 SUBMITTAL DATA REQUIREMENTS 
1.3 CODE AND STANDARDS REQUIREMENTS 
1.4 MANUFACTURER'S RESPONSIBILITY 
1.5 RELATED WORK 
1.6 DESIGN REQUIREMENTS 
1.7 QUALITY ASSURANCE 

PART 2 - PRODUCTS

2.1 INTENT 
2.2 PRODUCT DESCRIPTIONS 

PART 3 - EXECUTION

3.1 GENERAL 
3.2 VIBRATION ISOLATION AND SEISMIC RESTRAINT OF PIPING, DUCTWORK, AND CONDUIT 
3.3 SEISMIC RESTRAINT EXCLUSIONS 
3.4 INSTALLATION OF VIBRATION ISOLATION EQUIPMENT 

END OF INDEX
PART 1 - GENERAL

1.1 DESCRIPTION

A. General: The work noted within section 23 05 48 is referenced by division 21 00 00, 22 00 00, 23 00 00, 26 00 00. Provide all necessary labor & material in each division as required herein.

B. Intent:
1. All mechanical equipment, piping, and ductwork shall be mounted on vibration isolators to prevent the transmission of vibration and mechanically transmitted sound to the building structure. Vibration isolators shall be selected in accordance with the weight distribution so as to produce reasonably uniform deflections.
2. All isolators and isolation materials shall be of the same manufacturer and shall be certified by the manufacturer.
3. It is the intent of the seismic portion of this specification to keep all mechanical and electrical building system components in place during a seismic event.
4. All such systems must be installed in strict accordance with seismic codes, component manufacturer's, and building construction standards. Whenever a conflict occurs between the manufacturer's or construction standards, the most stringent shall apply.
5. This specification is considered to be minimum requirements for seismic consideration and is not intended as a substitute for legislated, more stringent, national, state or local construction requirements (i.e. California Title 24, California OSHPD, Canadian Building Codes, or other requirements).
6. Any variance or non-compliance with these specification requirements shall be corrected by the contractor in an approved manner.

C. The work in this section includes, but is not limited to the following:
1. Vibration isolation for piping, ductwork and equipment.
2. Equipment isolation bases.
3. Flexible piping connections.
4. Seismic restraints for isolated equipment.
5. Seismic restraints for non-isolated equipment.
6. Certification of seismic restraint designs and installation supervision.
7. Certification of seismic attachment of housekeeping pads.
8. All mechanical and electrical systems. Equipment buried underground is excluded but entry of services through the foundation wall is included. Equipment referred to below is typical. (Equipment not listed is still included in this specification).

<table>
<thead>
<tr>
<th>AC Units</th>
<th>Generators</th>
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<tbody>
<tr>
<td>Air Cooled Condensing Units</td>
<td>Heat Exchangers</td>
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<tr>
<td>Air Handling Units</td>
<td>Light Fixtures</td>
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<tr>
<td>Air Separators</td>
<td>Piping</td>
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<tr>
<td>Boilers</td>
<td>Pumps (all types)</td>
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<tr>
<td>Cable Trays</td>
<td>Rooftop Units</td>
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<tr>
<td>Conduit</td>
<td>Tanks (all types)</td>
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<tr>
<td>Ductwork</td>
<td>Unit Heaters</td>
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<tr>
<td>Electrical Panels</td>
<td>Var. Freq. Drives</td>
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<tr>
<td>Fans (all types)</td>
<td>VAV Boxes</td>
</tr>
<tr>
<td></td>
<td>Water Heaters</td>
</tr>
</tbody>
</table>

D. Definitions:

1. Life Safety Systems
   a. All systems involved with fire protection including sprinkler piping, fire pumps, jockey pumps, fire pump control panels, service water supply piping, water tanks, fire dampers and smoke exhaust systems.
   b. All systems involved with and/or connected to emergency power supply including all generators, transfer switches, transformers, and all flowpaths to fire protection and/or emergency lighting systems.
   c. All medical and life support systems.
   d. Fresh air & relief systems on emergency control sequence including air handlers, conduit, duct, dampers, etc.

2. Positive Attachment
   a. A positive attachment is defined as a cast-in anchor, a drill-in wedge anchor, a double sided beam clamp loaded perpendicular to a beam, or a welded or bolted connection to structure. Single sided "C" type beam clamps for support rods of overhead piping, ductwork, fire protection, electrical conduit, bus duct, or cable trays, etc. are not acceptable as seismic anchor points.

3. Transverse Bracing
   a. Restraint(s) applied to limit motion perpendicular to the centerline of the pipe, duct or conduit.
4. Longitudinal Bracing
   a. Restraint(s) applied to limit motion parallel to the centerline of the pipe, duct or conduit.

1.2 SUBMITTAL DATA REQUIREMENTS

A. In addition to requirements of Section 013500, the manufacturer of vibration isolation and seismic restraints shall provide submittals for products as follows:

1. Descriptive Data
   a. Catalog cuts or data sheets on vibration isolators and specific restraints detailing compliance with the specification.
   b. Detailed schedules of flexible and rigidly mounted equipment, showing vibration isolators and seismic restraints by referencing numbered descriptive drawings.

2. Shop Drawings
   a. Submit fabrication details for equipment bases including dimensions, structural member sizes and support point locations.
   b. Provide all details of suspension and support for ceiling hung equipment.
   c. Where walls, floors, slabs or supplementary steel work are used for seismic restraint locations, details of acceptable attachment methods for ducts, conduit and pipe must be included and approved before the condition is accepted for installation. Restraint manufacturers' submittals must include spacing, static loads and seismic loads at all attachment and support points.
   d. Provide specific details of seismic restraints and anchors; include number, size and locations for each piece of equipment.

3. Seismic Certification and Analysis
   a. Seismic restraint calculations must be provided for all connections of equipment to the structure. Calculations must be stamped by a registered professional engineer with at least five years of seismic design experience, licensed in the state of the job location.
   b. All restraining devices shall have a pre-approval number from California OSHPD or some other recognized government agency showing maximum restraint ratings. Calculations (including the combining of tensile and shear loadings) to support seismic restraint designs must be stamped by a registered professional engineer with at least five years of seismic design experience and licensed in the state of the job location. Testing and calculations must include both shear and tensile loads as well as one test or analysis at 450 to the weakest mode.
c. Analysis must indicate calculated dead loads, static seismic loads and capacity of materials utilized for connections to equipment and structure. Analysis must detail anchoring methods, bolt diameter, embodiment and/or welded length. All seismic restraint devices shall be designed to accept, without failure, the forces required acting through the equipment center of gravity. Overturning moments may exceed forces at ground level.

1.3 CODE AND STANDARDS REQUIREMENTS

A. Typical Applicable Codes, Standards, and Categories:
   1. International Building Code 2015 with an effective peak acceleration coefficient of 0.15.
   3. Seismic hazard exposure group of I, II, III and seismic performance category of C, D.

1.4 MANUFACTURER’S RESPONSIBILITY

A. Manufacturer of vibration isolation and seismic control equipment shall have the following responsibilities:
   1. Determine vibration isolation and seismic restraint sizes and locations.
   2. Provide vibration isolation and seismic restraints.
   3. Provide calculations and materials if required for restraint of unisolated equipment.
   4. Provide installation instructions, drawings and trained field supervision to insure proper installation and performance.

1.5 RELATED WORK

A. Housekeeping Pads:
   1. Housekeeping pads shall be coordinated with restraint vendor and sized to provide a minimum edge distance of ten (10) bolt diameters all around the outermost anchor bolt to allow development of full drill-in wedge anchor ratings. If cast-in anchors are to be used, the housekeeping pads shall be sized to accommodate the ACI requirements for bolt coverage and embodiment.

B. Supplementary Support Steel:
   1. Contractor shall supply supplementary support steel for all equipment, piping, ductwork, etc. including roof mounted equipment.
C. Attachments:
   1. Contractor shall supply restraint attachment plates cast into housekeeping pads, concrete inserts, double sided beam clamps, etc. in accordance with the requirements of the vibration vendor's calculations.

1.6 DESIGN REQUIREMENTS

A. Design isolators for equipment installed outdoors to provide adequate restraint to withstand the force of a 100 mph wind applied to any exposed surface of the isolated equipment. Isolators for outdoor equipment shall have bolt holes for attachment to equipment and to supports. The vibration isolation Vendor shall submit verifying shear and overturning calculations, for their product and equipment installation arrangement, stamped by a licensed Professional Engineer. The design and supply of miscellaneous support steel above and below isolators will not be the responsibility of the vibration isolation manufacturer.

1.7 QUALITY ASSURANCE

A. Coordinate the size, location, and special requirements of vibration isolation equipment and systems with other trades. Coordinate plan dimensions with size of housekeeping pads.

B. Provide vibration isolators of the appropriate sizes, with the proper loading to meet the specified deflection requirements.

C. Supply and install any incidental materials such as mounting brackets, attachments and other accessories as may be needed to meet the requirements stated herein, even if not expressly specified or shown on the drawings, without claim for additional payment.

D. Verify correctness of equipment model numbers and conformance of each component with manufacturer's specifications.

E. Should any rotating equipment cause excessive noise or vibration when properly installed on the specified isolators, the Contractor shall be responsible for rebalancing, realignment, or other remedial work required to reduce noise and vibration levels. Excessive is defined as exceeding the manufacturer's specifications for the unit in question.
PART 2 - PRODUCTS

2.1 INTENT

A. All vibration isolators and seismic restraints described in this section shall be the product of a single manufacturer. Mason Industry's products are the basis of these specifications; products of other manufacturers are acceptable provided their systems strictly comply with the specification.

B. For the purposes of this project, failure is defined as the discontinuance of any attachment point between equipment or structure, vertical permanent deformation greater than 1/8 inch and/or horizontal permanent deformation greater than 1/4 inch.

2.2 PRODUCT DESCRIPTIONS

A. Vibration Isolators and Seismic Restraints.

GENERAL:


2. Isolators installed out-of-doors shall have base plates with bolt holes for fastening the isolators to the support members.

3. Isolator types are scheduled to establish minimum standards. At the Contractor's option, labor-saving accessories can be an integral part of isolators supplied to provide initial lift of equipment to operating height, hold piping at fixed elevations during installation and initial system filling operations, and similar installation advantages. Accessories and seismic restraint features must not degrade the isolation performance of the isolators.

4. Static deflection of isolators shall be as provided in the EXECUTION section and as shown on the drawings. All static deflections stated are the minimum acceptable

5. Deflection for the mounts under actual load. Isolators selected solely on the basis of rated deflections are not acceptable and will be disapproved.

SPECIFICATION:

1. Two layers of 3/4" thick neoprene pad consisting of 2" square waffle modules separated horizontally by a 16 gauge galvanized shim. Load distribution plates shall be used as required. Pads shall be Type Super "W" as manufactured by Mason Industries, Inc.
2. Bridge-bearing neoprene mountings shall have a minimum static deflection of 0.2" and all directional seismic capability. The mount shall consist of a ductile iron casting containing two separated and opposing molded neoprene elements. The elements shall prevent the central threaded sleeve and attachment bolt from contacting the casting during normal operation. The shock absorbing neoprene materials shall be compounded to bridge-bearing specifications. Mountings shall have an Anchorage Pre-approval "R" Number from OSHPD in the State of California verifying the maximum certified horizontal and vertical load ratings. Mountings shall be Type BR as manufactured by Mason Industries, Inc.

3. Sheet metal panels shall be bolted to the walls or supporting structure by assemblies consisting of a neoprene bushing cushioned between 2 steel sleeves. The outer sleeve prevents the sheet metal from cutting into the neoprene. Enlarge panel holes as required. Neoprene elements pass over the bushing to cushion the back panel horizontally. A steel disc covers the inside neoprene element and the inner steel sleeve is elongated to act as a stop so tightening the anchor bolts does not interfere with panel isolation in 3 planes. Bushing assemblies can be applied to the ends of steel cross members where applicable. All neoprene shall be bridge bearing quality. Bushing assemblies shall be type PB as manufactured by Mason Industries, Inc.

4. A one (1) piece molded bridge bearing neoprene washer/bushing. The bushing shall surround the anchor bolt and have a flat washer face to avoid metal to metal contact. Neoprene bushings shall be type HG as manufactured by Mason Industries, Inc.

5. Spring isolators shall be free standing and laterally stable without any housing and complete with a molded neoprene cup or 1/4" neoprene acoustical friction pad between the baseplate and the support. All mountings shall have leveling bolts that must be rigidly bolted to the equipment. Spring diameters shall be no less than 0.8 of the compressed height of the spring at rated load. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Submittals shall include spring diameters, deflection, compressed spring height and solid spring height. Mountings shall be Type SLF as manufactured by Mason Industries, Inc.

6. Restrained spring mountings shall have an SLF mounting as described in Specification 5, within a rigid housing that includes vertical limit stops to prevent spring extension when weight is removed. The housing shall serve as blocking during erection. A steel spacer shall be removed after adjustment. Installed and operating heights are equal. A minimum clearance of 1/2" shall be maintained around restraining bolts and between the housing and the spring so as not to interfere with the spring action. Limit stops shall be out of contact during normal operation. Since housings will be bolted or welded in position there
must be an internal isolation pad. Housing shall be designed to resist all seismic forces. Mountings shall have Anchorage Pre-approval "R" Number from OSHPD in the state of California certifying the maximum certified horizontal and vertical load ratings. Mountings shall be SLR as manufactured by Mason Industries, Inc.

7. Spring mountings as in specification 5 built into ductile iron or steel housing to provide all directional seismic snubbing. The snubber shall be adjustable vertically and allow a maximum of 1/4 inch travel in all directions before contacting the resilient snubbing collars. Mountings shall have an Anchorage Pre-approval "R" number from OSHPD in the State of California verifying the maximum certified horizontal and vertical load ratings. Mountings shall be SSLFH as manufactured by Mason Industries, Inc.

8. Air Springs shall be manufactured with upper and lower steel sections connected by a replaceable flexible nylon reinforced neoprene element. Air spring configuration shall be multiple bellows to achieve a maximum natural frequency of 3 Hz. Air Springs shall be designed for a burst pressure that is a minimum of three times the published maximum operating pressure. All air spring systems shall be connected to either the building control air or a supplementary air supply and equipped with three leveling valves to maintain leveling within plus or minus 1/8". Submittals shall include natural frequency, load and damping tests performed by an independent lab or acoustician. Air Springs shall be Type MT and leveling valves Type LV as manufactured by Mason Industries, Inc.

9. Restrained air spring mountings shall have an MT air spring as described in Specification 8, within a rigid housing that includes vertical limit stops to prevent air spring extension when weight is removed. The housing shall serve as blocking during erection. A steel spacer shall be removed after adjustment. Installed and operating heights are equal. A minimum clearance of 1/2" shall be maintained around restraining bolts and between the housing and the air spring so as not to interfere with the air spring action. Limit stops shall be out of contact during normal operation. Housing shall be designed to resist all seismic forces. Mountings shall be SLR-MT as manufactured by Mason Industries, Inc.

10. Hangers shall consist of rigid steel frames containing minimum 1 1/4" thick neoprene elements at the top and a steel spring with general characteristics as in specification 5 seated in a steel washer reinforced neoprene cup on the bottom. The neoprene element and the cup shall have neoprene bushings projecting through the steel box. To maintain stability the boxes shall not be articulated as clevis hangers nor the neoprene element stacked on top of the spring. Spring diameters and hanger box lower hole sizes shall be large enough to permit the hanger rod to swing through a 30° arc from side to side before contacting the rod bushing and short circuiting the spring. Submittals shall include a
hanger drawing showing the 30° capability. Hangers shall be type 30° as manufactured by Mason Industries, Inc.

11. Hangers shall be as described in specifications 10, but they shall be pre-compressed and locked at the rated deflection by means of a resilient seismic upstop to keep the piping or equipment at a fixed elevation during installation. The hangers shall be designed with a release mechanism to free the spring after the installation is complete and the hanger is subjected to its full load. Deflection shall be clearly indicated by means of a scale. Submittals shall include a drawing of the hanger showing the 30° capability. Hangers shall be type PC30N as manufactured by Mason Industries, Inc.

12. Seismic Cable Restraints shall consist of galvanized steel aircraft cables sized to resist seismic loads with a minimum safety factor of two and arranged to provide all-directional restraint. Cable end connections shall be steel assemblies that swivel to final installation angle and utilize two clamping bolts to provide proper cable engagement. Cables must not be allowed to bend across sharp edges. Cable assemblies shall have an Anchorage Pre-approval "R" Number from OSHPD in the State of California verifying the maximum certified load ratings. Cable assemblies shall be Type SCB at the ceiling and at the clevis bolt, SCBH between the hanger rod nut and the clevis or SCBV if clamped to a beam all as manufactured by Mason Industries, Inc.

13. Seismic solid braces shall consist of steel angles or channels to resist seismic loads with a minimum safety factor of 2 and arranged to provide all directional restraint. Seismic solid brace end connectors shall be steel assemblies that swivel to the final installation angle and utilize two through bolts to provide proper attachment. Seismic solid brace assembly shall have anchorage pre-approval "R" number from OSHPD in the state of California verifying the maximum certified load ratings. Solid seismic brace assemblies shall be type SSB as manufactured by Mason Industries, Inc.

Note: Specifications 12 - 14 apply to trapeze as well as clevis hanger locations. At trapeze anchor locations piping must be shackled to the trapeze. Specifications apply to hanging equipment as well.

14. Steel angles, sized to prevent buckling, shall be clamped to pipe or equipment rods utilizing a minimum of three ductile iron clamps at each restraint location when required. Welding of support rods is not acceptable. Rod clamp assemblies shall have an Anchorage Pre-approval "R" Number from OSHPD in the State of California. Rod clamp assemblies shall be Type SRC as manufactured by Mason Industries, Inc.
15. Pipe clevis cross bolt braces are required in all restraint locations. They shall be special purpose performed channels deep enough to be held in place by bolts passing over the cross bolt. Clevis cross braces shall have an Anchorage Pre-approval "R" Number from OSHPD in the State of California. Clevis cross brace shall be type CCB as manufactured by Mason Industries, Inc.

16. All-directional seismic snubbers shall consist of interlocking steel members restrained by a one-piece molded neoprene bushing of bridge bearing neoprene. Bushing shall be replaceable and a minimum of 1/4 inch thick. Rated loading shall not exceed 1,000 psi. A minimum air gap of 1/8 inch shall be incorporated in the snubber design in all directions before contact is made between the rigid and resilient surfaces. Snubber end caps shall be removable to allow inspection of internal clearances. Neoprene bushings shall be rotated to insure no short circuits exist before systems are activated. Snubbers shall have an Anchorage Pre-approval "R" Number from OSHPD in the State of California verifying the maximum certified horizontal and vertical load ratings. Snubber shall be Type Z-1 225 as manufactured by Mason Industries, Inc.

17. All directional seismic snubbers shall consist of interlocking steel members restrained by shock absorbent rubber materials compounded to bridge bearing specifications. Elastomeric materials shall be replaceable and a minimum of 3/4" thick. Rated loadings shall not exceed 1,000 psi. Snubbers shall be manufactured with an air gap between hard and resilient material of not less than 1/8" nor more that 1/4". Snubbers shall be installed with factory set clearances. The capacity of the seismic snubber at 3/8" deflection shall be equal or greater than the load assigned to the mounting grouping controlled by the snubber multiplied by the applicable "G" force. Submittals shall include the load deflection curves up to 1/2" deflection in the x, y and z planes. Snubbers shall have an anchorage pre-approval "R" number from OSHPD in the state of California verifying the maximum certified horizontal and vertical load ratings. Snubbers shall be series Z-101 1 as manufactured by Mason Industries, Inc.

18. Stud wedge anchors shall be manufactured from full diameter wire, not from undersized wire that is "rolled up" to create the thread. The stud anchor shall also have a safety shoulder which fully supports the wedge ring under load. The stud anchors shall have an evaluation report number from the I.C.B.0 Evaluation Service, Inc. verifying its allowable loads. Drill-in stud wedge anchors shall be type SAS as manufactured by Mason Industries, Inc.
19. Female wedge anchors are preferred in floor locations so isolators or equipment can be slid into place after the anchors are installed. Anchors shall be manufactured from full diameter wire, and shall have a safety shoulder to fully support the wedge ring under load. Female wedge anchors shall have an evaluation report number from the I.C.B.O Evaluation Service, Inc. verifying to its allowable loads. Drill-in female wedge anchors shall be type SAB as manufactured by Mason Industries, Inc.

20. Vibration isolation manufacturer shall furnish integral structural steel bases. Rectangular bases are preferred for all equipment. Centrifugal refrigeration machines and pump bases may be T or L shaped where space is a problem. Pump bases for split case pump shall include supports for suction and discharge elbows. All perimeter members shall be steel beams with a minimum depth equal to 1/10 of the longest dimension of the base. Base depth need not exceed 14' provided that the deflection and misalignment is kept within acceptable limits as determined by the manufacturer. Height saving brackets shall be employed in all mounting locations to provide a base clearance of 1". Bases shall be type WF as manufactured by Mason Industries, Inc.

21. Vibration isolation manufacturer shall furnish rectangular steel concrete pouring forms for floating and inertia foundations. Bases for split case pumps shall be large enough to provide for suction and discharge elbows. Bases shall be a minimum of 1/12 of the longest dimension of the base but not less than 6". The base depth need not exceed 1 2" unless specifically recommended by the base manufacturer for mass or rigidity. Forms shall include minimum concrete reinforcing consisting of 1/2" bars welded in place on 6" centers running both ways in a layer 1 1/2" above the bottom. Forms shall be furnished with steel templates to hold the anchor bolts sleeves and anchors while concrete is being poured. Height saving brackets shall be employed in all mounting locations to maintain a 1" clearance below the base. Wooden formed bases leaving a concrete rather than a steel finish are not acceptable. Base shall be type BMK or K as manufactured by Mason Industries, Inc.

22. Roof Curb (by HVAC Contractor)
   a. Curb mounted rooftop equipment shall be mounted on structural spring isolation curbs that bear directly on the roof support structure, and are flashed and waterproofed into the roof's membrane waterproofing system. All spring locations shall have removable waterproof covers to allow for spring adjustment and/or removal. Springs shall be Type A.
   b. Unit shall be provided with wood nailer and flashing.
   c. Curbs shall meet all NRCA Standards.
   d. Curbs shall be similar to Novia Associates VibCurb III or equal having a minimum 3" rated static deflection or approved equal.
e. Vibration control: The spring roof curb shall have the top isolated or floating rail attached in a manner to the fixed lower portion of the curb without short circuiting or bridging between the two. Restraining bolt(s) or threaded rod shall be of sufficient size to withstand the applied wind & or seismic forces at each spring pack location.

f. An alignment bolt shall be installed before connecting the floating to non-floating parts to guarantee perfect centering of the restraining bolts.

g. Weather proofing & air seal: The spring curb must keep the weather (air and water) out and any airflow from the RTU in. The weather seal must not have the ability to fail and allow water or air into the building.

h. The use of exposed exterior neoprene or some other elastomer material to seal the top floating rail from the base of the curb is not acceptable.

i. Vibration Mountings: Provide a rubber gasket covered by formed galvanized sheet metal top flashing that overhangs the top wood nailer and galvanized bottom flashing. The overlapping shall effectively cover the rubber gasket so it is protected from the elements.

j. The top flashing / support rail shall be 14 ga. G60–Zc steel formed with 90 bends that extend down to the wood nailer. Provide a counter flashing member with a sponge gasket attached that presses up against the horizontal bend. The seal shall be replaceable, protected from the elements and easy to install.

k. Curb side material: Provide 12 Ga. G60 galvanized steel for curb side construction. All side and end seam between sheets shall be continuously welded, corner joints to be caulked and bolted.

l. Structural Capability:

1) Curbs shall be installed on metal decking/concrete slab. Air handling unit load shall be properly distributed. Coordinate curb construction with pitch of roof. Curbs shall be built to match the roof pitch in accordance with all requirements of this project. Positive attachment of the curb to the structure is imperative. Pitch correction shall be fabricated from 12 gauge galvanized material and be continuous on all sides and ends. Field fabricated and installed tube steel stub-ups are not acceptable. HVAC contractor shall provide detailed information to the curb manufacturer regarding pitch correction.
2) Plenum Sections: The side material must be capable of handling the static pressure developed by the fans and not ‘oil can’. Provide spanning bar joists as required to support plenum installation (even when the spring pockets are center span).

3) Provide a continuous bottom tube steel member or side material of sufficient strength. Mechanical contractor shall coordinate and verify all dimensions, weights, roof penetrations, etc. with the Structural Engineer prior to installation.

4) Curb Insulation: Provide spring curbs with a space between the floating and non-floating parts for the installation of insulation. Curb manufacturer shall provide factory installed insulation adhered to roof curb. Curbs shall be externally factory insulated with a 1.7” thick R-12 foam insulation, FM Class 1 and UL Class A Ratings, with bonded fiber reinforced facer.

m. Protection: Curbs shall be completely shrink-wrapped during shipping.

n. Mechanical contractor shall provide all necessary materials to completely weather proof and sound proof the curb installation.

o. Additional features:

1) Sound barrier: Provide a sound barrier package, consisting of G60 galvanized back-to-back angles. Sound barrier package shall be capable of supporting two layers of 1/2” Durock concrete board with a maximum deflection over the width of the curb of L/360. Durock furnished and installed by the HVAC Contractor. Overlap all joints, caulk all seams and edges. Transmission Loss & STC shall be as shown as follows. Sound Transmission Loss at Frequency (Cycles per second) of (125)=20, (250)=27, (500)=30, (1000)=32, (2000)=30, (4000)=38, (STC)=31.

2) Provide with framed Supply & Return air duct openings. Openings shall match duct sizes and have 1” galvanized steel flanges.
3) Plenum sections: Where indicated on the drawings, provide in the interior of the curb, double wall acoustical floor, walls and plenum divider. All insulation shall be 2" thick fiber glass acoustical duct liner with reinforced coating system. Insulation acoustical performance shall be as follows. Liner shall not support microbial growth and shall be EPA registered and pass ASTM C 1071 & ASTM G21 bacterial tests conducted in accordance with ASTM G22. Floors up to 90" curb I.D. width shall be constructed of 22 Ga., 20 Ga. thereafter, solid G60 galvanized bottom panels and 22 Ga. galvanized perforated 22.7% open area top panel. Floor shall be attached to walls and plenum divider to provide an airtight plenum. Walls shall have 22 Ga. galvanized perforated 22.7% open area inside panels. Plenum divider shall be double wall 22 Ga. perforated galvanized 22.7% open area panel on the supply side with a 14 gauge solid panel opposite. Sound Absorption Coefficient at Frequency (Cycles per second) of (125)=.23, (250)=.64, (500)=.99, (1000)=1.05, (2000)=1.00, (4000)=.98, (NRC)=.90.

23. Flexible spherical expansion joints shall employ peroxide cured EPDM in the covers, liners and Dacron tire cord friction ring. Solid steel rings shall be used within the raised face rubber ends to prevent pullout. Flexible cable bead wire is not acceptable. Sizes 2" and larger shall have two spheres reinforced with a ring between spheres to maintain shape and complete with split ductile iron or steel flanges with hooked or similar interlocks. Sizes 16" to 24" may be single sphere. Sizes 3/4" to 1 1/2" may have threaded bolted flange assemblies, one sphere and cable retention. 14" and smaller connectors shall be rated at 250 psi up to 190°F. with a uniform drop in allowable pressure to 190 psi at 250°F. 16" and larger connectors are rated 180 psi at 190°F. and 135 psi at 250°F. Safety factors to burst and flange pullout shall be a minimum of 3/1. All joints must have permanent markings verifying a 5 minute factory test at twice the rated pressure. Concentric reducers to the above specifications may be substituted for equal ended expansion joints.

Expansion joints shall be installed in piping gaps equal to the length of the expansion joints under pressure. Control rods need only be used in unanchored piping locations where the manufacturer determines the installation exceeds the pressure requirement without control rods, as control rods are not desirable in seismic work. If control rods are used, they must have 1/2" thick Neoprene washer bushings large enough in area to take the thrust at 1000 psi maximum on the washer area. Expansion joints shall be installed on the equipment side of the shut off valves.
Submittals shall include two test reports by independent consultants showing minimum reductions of 20 DB in vibration accelerations and 10 DB in sound pressure levels at typical blade passage frequencies on this or a similar product by the same manufacturer. All expansion joints shall be installed on the equipment side of the shut off valves. Expansion joints shall be SAFEFLEX SFDEJ, SFEJ, SFDCR or SFU and Control Rods CR as manufactured by Mason Industries, Inc.

24. Flexible stainless steel hose shall have stainless steel braid and carbon steel fittings. Sizes 3” and larger shall be flanged. Smaller sizes shall have male nipples. Minimum lengths shall be as tabulated:

<table>
<thead>
<tr>
<th>Flanged</th>
<th>Male Nipples</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 x 14</td>
<td>½ x 9</td>
</tr>
<tr>
<td>4 x 15</td>
<td>¾ x 10</td>
</tr>
<tr>
<td>5 x 19</td>
<td>1 x 11</td>
</tr>
<tr>
<td>6 x 20</td>
<td>1-1/4 x 12</td>
</tr>
<tr>
<td>8 x 22</td>
<td></td>
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</tbody>
</table>

Hoses shall be installed on the equipment side of the shut-off valves horizontally and parallel to the equipment shafts wherever possible. Hoses shall be type BSS as manufactured by Mason Industries, Inc.

25. All-directional acoustical pipe anchor, consisting of two sizes of steel tubing separated by a minimum 1/2” thick 60 durometer neoprene. Vertical restraint shall be provided by similar material arranged to prevent vertical travel in either direction. Allowable loads on the isolation material should not exceed 500 psi and the design shall be balanced for equal resistance in any direction. All-directional anchors shall be type ADA as manufactured by Mason Industries, Inc.

26. Pipe guides shall consist of a telescopic arrangement of two sizes of steel tubing separated by a minimum 1/2” thickness of 60 durometer neoprene. The height of the guides shall be preset with a shear pin to allow vertical motion due to pipe expansion or contraction. Shear pin shall be removable and reinsertable to allow for selection of pipe movement. Guides shall be capable of + 1 5/8” motion, or to meet location requirements. Pipe guides shall be type VSG as manufactured by Mason Industries, Inc.
27. Split Wall Seals consist of two bolted pipe halves with minimum 3/4" thick neoprene sponge bonded to the inner faces. The seal shall be tightened around the pipe to eliminate clearance between the inner sponge face and the piping. Concrete may be packed around the seal to make it integral with the floor, wall or ceiling if the seal is not already in place around the pipe prior to the construction of the building member. Seals shall project a minimum of 1" past either face of the wall. Where temperatures exceed 240°F., 10# density fiberglass may be used in lieu of the sponge. Seals shall be Type SWS as manufactured by Mason Industries, Inc.

28. The horizontal thrust restraint shall consist of a spring element in series with a neoprene molded cup as described in specification 5 with the same deflection as specified for the mountings or hangers. The spring element shall be designed so it can be preset for thrust at the factory and adjusted in the field to allow for a maximum of 1/4" movement at start and stop. The assembly shall be furnished with 1 rod and angle brackets for attachment to both the equipment and the duct work or the equipment and the structure. Horizontal restraints shall be attached at the centerline of thrust and symmetrical on either side of the unit. Horizontal thrust restraints shall be type WBI/WBD as manufactured by Mason Industries, Inc.

PART 3 - EXECUTION

3.1 GENERAL

A. All vibration isolators and seismic restraint systems must be installed in strict accordance with the manufacturers written instructions and all certified submittal data. At the completion of all construction work the vibration and seismic device supplier shall inspect all installations and provided a written report of installation compliance to the engineer of record. A copy of this written certification shall also be provided in the operations manual provided to the owner.

B. Installation of vibration isolators and seismic restraints must not cause any change of position of equipment, piping or duct work resulting in stresses or misalignment.

C. No rigid connections between equipment and the building structure shall be made that degrades the noise and vibration control system herein specified.

D. The contractor shall not install any equipment, piping, duct or conduit which makes rigid connections with the building unless isolation is not specified. "Building" includes, but is not limited to, slabs, beams, columns, studs and walls.

E. Coordinate work with other trades to avoid rigid contact with the building.
F. Any conflicts with other trades which will result in rigid contact with equipment or piping due to inadequate space or other unforeseen conditions should be brought to the architects/engineers attention prior to installation. Corrective work necessitated by conflicts after installation shall be at the responsible contractor’s expense.

G. Bring to the architects/engineers attention any discrepancies between the specifications and the field conditions or changes required due to specific equipment selection, prior to installation. Corrective work necessitated by discrepancies after installation shall be at the responsible contractor’s expense.

H. Correct, at no additional cost, all installations which are deemed defective in workmanship and materials at the contractor’s expense.

I. Overstressing of the building structure must not occur because of overhead support of equipment. Contractor must submit loads to the structural engineer of record for approval. Generally bracing may occur from:
   1. Flanges of structural beams.
   2. Upper truss cords in bar joist construction.
   3. Cast-in-place inserts or wedge type drill-in concrete anchors.

J. Specification 12 cable restraints shall be installed slightly slack to avoid short circuiting the isolated suspended equipment, piping or conduit.

K. Specification 12 cable assemblies are installed taut on non-isolated systems. Specification 13 seismic solid braces may be used in place of cables on rigidly attached systems only.

L. At locations where specification 12 or 13 restraints are located, the support rods must be braced when necessary to accept compressive loads with specification 14 braces.

M. At all locations where specification 12 or 13 restraints are attached to pipe clevis’s, the clevis cross bolt must be reinforced with specification type 15 braces.

N. Drill-in concrete anchors for ceiling and wall installation shall be specification type 18, and specification type 19 female wedge type for floor mounted equipment.

O. Vibration isolation manufacturer shall furnish integral structural steel bases as required. Independent steel rails are not permitted on this project.

P. Hand built elastomeric expansion joints may be used when pipe sizes exceed 24" or specified movements exceed specification 23 capabilities.

Q. Where piping passes through walls, floors or ceilings the vibration isolation manufacturer shall provide specification 27 wall seals.
R. Air handling equipment and centrifugal fans shall be protected against excessive displacement which results from high air thrust in relation to the equipment weight. Horizontal thrust restraint shall be specification type 28.

S. Locate isolation hangers as near to the overhead support structure as possible.

3.2 VIBRATION ISOLATION AND SEISMIC RESTRAINT OF PIPING, DUCTWORK, AND CONDUIT

A. Where piping connects to rotating or vibrating mechanical equipment install specification 23 expansion joints or specification 24 stainless hoses if 23 is not suitable for the service.

B. Seismic Restraint of Piping:
   1. Seismically restrain all piping listed as a, b or c below. Use specification 12 cables.
      a. Fuel oil piping, gas piping, medical gas piping, and compressed air piping.
      b. Piping located in boiler rooms, mechanical equipment rooms, and refrigeration equipment rooms that is 1 1/4" I.D. and larger.
      c. All other piping 2 1/2" diameter and larger.
   2. Transverse piping restraints shall be at 40' maximum spacing for all pipe sizes, except where lesser spacing is required to limit anchorage loads.
   3. Longitudinal restraints shall be at 80' maximum spacing for all pipe sizes, except where lesser spacing is required to limit anchorage loads.
   4. Where thermal expansion is a consideration, guides and anchors may be used as transverse and longitudinal restraints provided they have a capacity equal to or greater than the restraint loads in addition to the loads induced by expansion or contraction.
   5. For fuel oil and all gas piping transverse restraints must be at 20' maximum and longitudinal restraints at 40' maximum spacing.
   6. Transverse restraint for one pipe section may also act as a longitudinal restraint for a pipe section of the same size connected perpendicular to it if the restraint is installed within 24" of the elbow or TEE or combined stresses are within allowable limits at longer distances.
   7. Hold down clamps must be used to attach pipe to all trapeze members before applying restraints in a manner similar to clevis supports.
   8. Branch lines may not be used to restrain main lines.

C. Pipe Isolation
   1. All chilled water, condenser water, hot water, steam, refrigerant, drain and engine exhaust piping that is connected to vibration-isolated equipment shall be isolated from the building structure within the following limits:
Within mechanical rooms;
Within 50’ total pipe length of connected vibration-isolated equipment (chillers, pumps, air handling units, pressure reducing stations, etc.);

2. At every support point for piping that is greater than 4 inches in diameter.

3. Piping shall be isolated from the building structure by means of vibration isolators, resilient lateral supports, and resilient penetration sleeve/seals.

4. Isolators for the first three support points adjacent to connected equipment shall achieve one half the specified static deflection of the isolators supporting the connected equipment. When the required static deflection of these isolators is greater than 1/2", Type FSN or HSN isolators shall be used. When the required static deflection is less than or equal to 1/2", Type FN or HN isolators shall be used. All other pipe support isolators within the specified limits shall be either Type FN or HN achieving at least 1/4" static deflection.

5. Where lateral support of pipes is required within the specified limits, this shall be accomplished by use of resilient lateral supports.

6. Pipes within the specified limits that penetrate the building construction shall be isolated from the building structure by use of resilient penetration sleeve/seals.

7. Provide flexible pipe connections as called for under Major Equipment above and wherever shown on the drawings.

D. Seismic restraint of ductwork:

1. Seismically restrain all duct work with specification 12 or 13 restraints as listed below:
   a. Restrain rectangular ducts with cross sectional area of 6 sq. ft. or larger.
   b. Restrain round ducts with diameters of 28" or larger.
   c. Restrain flat oval ducts the same as rectangular ducts of the same nominal size.

2. Transverse restraints shall occur at 30' intervals or at both ends of the duct run if less than the specified interval. Transverse restraints shall be installed at each duct turn and at each end of a duct run.

3. Longitudinal restraints shall occur at 60' intervals with at least one restraint per duct run. Transverse restraints for one duct section may also act as a longitudinal restraint for a duct section connected perpendicular to it if the restraints are installed within 4’ of the intersection of the ducts and if the restraints are sized for the larger duct. Duct joints shall conform to SMACNA duct construction standards.
4. The ductwork must be reinforced at the restraint locations. Reinforcement shall consist of an additional angle on top of the ductwork that is attached to the support hanger rods. Ductwork is to be attached to both upper angle and lower trapeze.

5. A group of ducts may be combined in a larger frame so that the combined weights and dimensions of the ducts are less than or equal to the maximum weight and dimensions of the duct for which bracing details are selected.

6. Walls, including gypsum board non-bearing partitions, which have ducts running through them, may replace a typical transverse brace. Provide channel framing around ducts and solid blocking between the duct and frame.

E. Duct Isolation:
1. All sheet metal ducts and air plenums that are within mechanical rooms or within a distance of 50' total duct length of connected vibration-isolated equipment (whichever is longer) shall be isolated from the building structure by Type FN, PCF or HN isolators. All isolators shall achieve 0.1" minimum static deflection.

2. Ducts within the specified limits that penetrate the building construction shall be isolated from the building structure by use of resilient penetration sleeve/seals.

3. Flexible duct connections shall be provided as called for above under Major Equipment and wherever shown on the drawings.

F. Seismic Restraint of Electrical Services:
1. All electrical conduit 2-1/2" in diameter and larger shall be restrained with specification type 12 seismic cable restraints or specification type 13 for seismic solid brace restraints.

2. All electrical bus ducts, cable trays and ladder trays shall be restrained with specification type 12, seismic cable restraints or specification 13 seismic solid brace restraints.

3. Transverse restraints shall occur at 30' intervals or both ends if the electrical run is less than the specified interval. Transverse restraints shall be installed at each electrical services turn and at each end of the electric run.

4. Longitudinal restraints shall occur at 60' intervals with at least one restraint per electric run. Transverse restraints for one electric section may also act as a longitudinal restraint for a duct for an electric section connected perpendicular to it if the restraints are installed within 4' of the intersection of the electric run and if the restraints are sized for the larger electric run.
5. All rigid floor mounted equipment must have a resilient media between the equipment mounting hole and the anchor bolt. Neoprene bushings shall be specification type 4 and anchor bolts shall be specification type 18 or 19.

6. Wall mounted panels shall be mounted with specification type 3 bushings. Floor mounted panels shall be mounted on specification type 4 bushings. Anchor bolts shall be specification type 18 or 19.

G. All fire protection piping shall be braced in accordance with NFPA 13 and 14.

H. All mechanical equipment shall be vibration isolated and seismically restrained.
   1. All fire protection equipment is considered life safety equipment and shall be seismically restrained.

3.3 SEISMIC RESTRAINT EXCLUSIONS

A. Piping:
   1. All piping less than 2 1/2” except for gas and fire protection piping.
   2. All piping in boiler and mechanical equipment rooms less than 1 1/4" I.D.
   3. All clevis or trapeze supported piping suspended from hanger rods where the point of attachment is less than the 12” in length from the structure to the structural connection of the clevis or trapeze.
   4. All PVC and fiberglass suspended waste or vent pipe 6" in diameter and smaller.

B. Ductwork:
   1. Rectangular, square or oval ducts less than 6 sq. ft. in cross sectional area.
   2. Round duct less than 28” in diameter.
   3. Duct supported by hanger rods where the point of attachment is less than 12” in length from the structure to the structural connection of the duct work.

C. Electrical:
   1. All conduit less than 2 1/2" diameter suspended by individual hanger rods.
   2. All clevis or trapeze supported conduits suspended by hanger rods where the point of attachment is less than 1 2" in length from the structure to the structural connection of the clevis or trapeze.
3.4 INSTALLATION OF VIBRATION ISOLATION EQUIPMENT

A. General
1. Locations of all vibration isolation devices shall be selected for ease of inspection and adjustment as well as for proper operation.
2. Installation of vibration isolation equipment shall be in accordance with the manufacturer’s instructions.

B. Isolators
1. All vibration isolators shall be aligned squarely above or below mounting points of the supported equipment.
2. Isolators for equipment with bases shall be located on the sides of the bases which are parallel to the equipment shaft unless this is not possible because of physical constraints.
3. Locate isolators to provide stable support for equipment, without excess rocking.
4. Consideration shall be given to the location of the center of gravity of the system and the location and spacing of the isolators. If necessary, a base with suitable footprint shall be provided to maintain stability of supported equipment, whether or not such a base is specifically called for herein.
5. If a housekeeping pad is provided, the isolators shall bear on the housekeeping pad and the isolator base plates shall rest entirely on the pad.
6. Hanger rods for vibration-isolated support shall be connected to major structural members, not the floor slab between major structural members. Provide suitable intermediate support members as necessary.
7. Vibration isolation hanger elements shall be positioned as high as possible in the hanger rod assembly, but not in contact with the building structure, and so that the hanger housing may rotate a full 360° about the rod axis without contacting any object.
8. Parallel running pipes may be hung together on a trapeze that is isolated from the building. Isolator deflections must be the greatest required by the provisions for pipe isolation for any single pipe on the trapeze. Do not mix isolated and unisolated pipes on the same trapeze.
15. Pipes, ducts and equipment shall not be supported from other pipes, ducts and equipment.
16. Resiliently isolated pipes, ducts and equipment shall not come in rigid contact with the building construction or rigidly supported equipment.
17. The installed and operating heights of equipment supported by Type FSNTL isolators or with Type RC-2 isolation bases shall be identical. Limit stops shall be out of contact during normal operation. Adjust isolators to provide 1/4" clearance between the limit stop brackets and the isolator top plate, and between the travel limit nuts and travel limit brackets.
18. Adjust all leveling bolts and hanger rod bolts so that the isolated equipment is level and in proper alignment with connecting ducts or pipes.

C. Bases
1. No equipment unit shall bear directly on vibration isolators unless its own frame is suitably rigid to span between isolators and such direct support is approved by the equipment manufacturer. This provision shall apply whether or not a base frame is called for on the schedule. In the case that a base frame is required for the unit because of the equipment manufacturer’s requirements and is not specifically called for on the equipment schedule, a base frame recommended by the equipment manufacturer shall be provided at no additional expense.
2. Unless otherwise indicated, there is to be a minimum operating clearance of 1" between steel rails, steel frame bases or inertia bases and the floor beneath the equipment. The isolator mounting brackets shall be positioned and the isolators adjusted so that the required clearance is maintained. The clearance space shall be checked by the Contractor to ensure that no construction debris has been left to short circuit or restrict the proper operation of the vibration isolation system.
3. Isolation bases shall be installed in strict accordance with the manufacturer’s instructions.

D. Flexible Duct Connections:
1. Prior to installation of the flexible connection, sheet metal ducts and plenum openings shall be squarely aligned with the fan discharge, fan intake, or adjacent duct section, and the gap between connected parts shall be uniform. Flexible duct connections shall not be installed until this provision is met. There shall be no metal-to-metal contact between connected sections, and the fabric shall not be stretched taut.
E. Flexible Pipe Connections:
1. Install flexible pipe connections in strict accordance with the manufacturer's instructions.

F. Thrust Restraints:
1. Thrust restraints shall be attached on each side of the fan parallel to the thrust force. This may require custom brackets or standoffs. The body of the thrust restraint shall not come in contact with the connected elements. Thrust restraints shall be adjusted to constrain equipment movement to the specified limit.

G. Grommets:
1. Where grommets are required at hold down bolts of isolators, bolt holes shall be properly sized to allow for grommets. The hold down bolt assembly shall include washers to distribute load evenly over the grommets. Bolts and washers shall be galvanized.

H. Resilient Penetration Sleeve/Seals:
1. Maintain an airtight seal around the penetrating element and prevent rigid contact between the penetrating element and the building structure. Fit the sleeve tightly to the building construction and seal airtight on both sides of the construction penetrated with acoustical sealant.

END OF SECTION
26 00 00
ELECTRICAL
(Filed Sub-Bid Required)

PART 1 - GENERAL .................................................................................................................. 1
  1.1 FILED SUB-BID REQUIRED .......................................................................................... 1
  1.2 GENERAL PROVISIONS ............................................................................................... 1
  1.3 DESCRIPTION OF WORK ............................................................................................ 2
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26 00 00
ELECTRICAL
(Filed Sub-Bid Required)

PART 1 - GENERAL

1.1 FILED SUB-BID REQUIRED

A. Time, Manner and Requirements for Submitting Sub-Bids:
   1. Sub-bids for work under this Section shall be for the complete work and
      shall be filed in a sealed envelope with the Public Agency at a time and
      place as stipulated in the “Instructions to Bidders.”
   2. Each sub-bid submitted for work under this Section shall be on forms
      furnished by the Awarding Authority as required by Section 44F of
      Chapter 149 of General Laws, as amended.
   3. Sub-bids filed with the Awarding Authority shall be accompanied by Bid
      Bond, Cash, Certified Check, Treasurer’s Check, or Cashier’s Check
      issued by a responsible bank or trust company payable to the City of
      New Bedford in the amount of 5 percent of the sub-bid. A sub-bid
      accompanied by any other form of bid deposit than those specified will
      be rejected.

B. The Filed Sub-Bidder for the work of this SECTION 26 00 00 shall list, in
   Paragraph E, of the FORM FOR SUB-BID, the name of each person, firm, or
   corporation, whom he proposes to use to perform the following classes of work
   or part thereof, at the bid price, therefore:

   CLASS OF WORK     PARAGRAPH NUMBERS
   None.

   If Sub-Bidder intends to perform with persons of his own staff the classes of
   work listed above, he must nevertheless list his own name therefore, under
   Paragraph E, of the FORM FOR SUB-BID.

C. The Work of this Section is shown in the following Drawings: E0.01, E1.00,
   E2.00, E3.00, E4.00, E4.01, ED1.00, VS.1, VS.2.

D. The Trade Contractor shall also examine all other Drawings and all other
   Sections of the Specifications for requirements therein affecting the Work of
   this Section, not just those pertaining to this Sub-trade.

1.2 GENERAL PROVISIONS

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

A. Work described herein shall be interpreted as work to be done by the Electrical Sub Contractor. Work to be performed by other trades will be referenced to a particular contractor.

B. Provide all labor, materials, tools, and equipment, including scaffolding, to complete the installation of the electrical system. Install, equip, adjust, and put into operation the respective portions of the installation specified, and so interconnect various items or sections of work in order to form a complete and operating whole. Systems may be referenced in singular or plural terms, also refer to drawings to confirm quantities. The work shall consist of, but shall not necessarily be limited to the following:

1. Secondary distribution equipment, current transformers, modifications to an existing system, motor controls, variable frequency drives, distribution panels, and panelboards, including feeders and subfeeders.
2. Fire alarm system, addressable type.
3. Emergency lighting and exit signs.
4. Lighting systems exterior and interior, including lamps, fixtures, occupancy sensors, controls, etc.
5. All raceway systems, including boxes, couplings, and fittings.
6. All branch circuit wiring systems, including wiring devices, plates, etc.
7. Connections for all building equipment, including mechanical, plumbing, fire protection, elevator and the like.
8. All testing of equipment installed.
9. Any other item of work hereinafter specified or indicated on electrical drawings.
10. Drilling, coring, and cutting of holes (where the largest dimension thereof does not exceed 12 inches) for electrical conduit systems, and equipment.
13. Fire stopping shall be performed by this contractor. Refer to Section 07 94 00 for further definition and products to be used.
14. Provide Seismic Restraints for all Electrical Systems conforming to the requirements of Section 230548 which Section is herein incorporated by reference.
15. Provide 120-volt power sources, raceways and backboxes for Technology Systems as shown on drawings
16. Phasing and selective demolition.
1.4 DEFINITIONS

A. Most terms used within the documents are industry standard. Certain words or phrases shall be understood to have specific meanings as follows:

1. Provide: Furnish and install completely connected up and in operable condition.

2. Furnish: Purchase and deliver to a specific location within the building or site.

3. Install: With respect to equipment furnished by others, install means to receive, unpack, move into position, mount and connect, including removal of packaging materials.

4. Conduit: Raceways of the metallic type which are not flexible. Specific types as specified.

5. Connect: To wire up, including all branch circuitry, control, and disconnection devices so the item is complete and ready for operation.

6. Subject to Mechanical Damage: Equipment and raceways installed exposed and less than eight feet above the finished floor in mechanical rooms or other areas where heavy equipment may be in use or moved.

1.5 ITEMS TO BE FURNISHED ONLY

A. Furnish the following items for installation under designated sections.

1. Duct smoke detectors with sampling tube, Section 23 00 00 – HVAC.

1.6 ITEMS TO BE WIRED ONLY

A. Install the following items furnished under designated sections.

1. None

1.7 RELATED WORK

A. The following related work is to be performed under designated sections.

1. Temp. Controls – SECTION 01 5 00 - TEMPORARY FACILITIES

2. Precast Bases, and Duct Envelopes: DIVISION 3 - CONCRETE.

3. Insulation - SECTION 07 20 00

4. Finish Painting: SECTION 09 90 00 - PAINTING.

5. Payment for energy for temporary light and power shall be made by General Contractor.

6. Cutting beyond 1.3, B.11 above and patching of all openings regardless of size will be by respective Sections of the trade responsible for the surface on which the penetration occurs.

7. Automatic Temperature Control: SECTION 23 00 00 - HEATING, VENTILATING, AND AIR CONDITIONING.

8. Hardware: SECTION 08 71 00 – FINISH HARDWARE.

9. Temporary Light and Power – Section 01 50 00 - TEMPORARY FACILITIES.
1.8 CONTRACT COST BREAKDOWN

A. Submit a breakdown of the contract price to aid Architect in determining the value of work installed as the job progresses.

1.9 INSPECTION OF SITE

A. Electrical bidders will be permitted to inspect the site. Failure to inspect existing conditions or to fully understand work which is required shall not excuse Electrical Subcontractor from his obligations to supply and install work in accordance with specifications and the drawings and under all site conditions as they exist.

1.10 CONTRACTOR'S REPRESENTATIVE

A. Retain a competent representative on the project.

1.11 COOPERATION

A. Work shall be carried on under usual construction conditions, in conjunction with other contractors work. Cooperate with other contractors, coordinate work and proceed in a manner as not to delay progress.

B. Before proceeding, examine all construction drawings and consult other contractors to coordinate installation and avoid interference.

C. In case of dispute, the Architect will render a decision in accordance with General and Supplementary General Conditions.

1.12 CODES, ORDINANCES, AND PERMITS

A. Codes and Ordinances:
   1. All material and work provided shall be in accordance with all applicable codes including the following codes and standards as most recently amended.
      State Building Code
      State Department of Public Safety
      NFPA 101 "Life Safety Code"
      NFPA Standards
      Standards of the Underwriters Laboratories (UL)
      Occupational Safety and Health Act (OSHA)
      Americans with Disabilities Act (ADA)
      Energy Conservation Code
      City of New Bedford
   2. Where contract documents indicate more stringent requirements than codes, the contract documents shall take precedence.
B. Permits: Be responsible for filing documents, and securing of inspection and approvals. Pay all permit fees. Pay fees for inspections and approvals.

1.13 ELECTRICAL ROOMS OR SPACES

A. Be responsible for ensuring that the dedicated space and clearances required in the NEC, Sections 110-26 are maintained for all electrical equipment.

B. Call other contractors' attention to the requirements contained in the above-mentioned code sections, prior to the installation of equipment by other contractors, in order to ensure no violations.

1.14 SUBMITTALS

A. Refer to Supplementary General Conditions for information relative to the submission of shop drawings. Six (6) copies are required. No equipment shall be installed prior to approval.

B. Notwithstanding any restrictions upon contractor proposed substitutions, should apparatus or materials be permitted by Architect to be substituted for those specified for good cause, and such substitution necessitates changes in or additional connections, piping, supports, or construction, same shall be provided. Assume cost and entire responsibility thereof.

C. Submit the following samples:
1. Lighting fixtures as may be requested.
2. Other items as may be requested.

D. Refer to Section 01 30 00 - SUBMITTALS AND PRODUCT SUBSTITUTIONS

1.15 GUARANTEE

A. Keep work in repair without expense to Owner as far as concerns defects in workmanship or materials for a period of not less than one year from date of substantial completion.

1.16 ELECTRICAL CHARACTERISTICS

A. In general, and unless specifically indicated otherwise, all building service, heating, ventilating, air conditioning, and plumbing equipment shall be of the following characteristics:
1. Motors up to and including 1/3 HP shall be suitable for 120 volts, one phase operation.
2. Motors larger than 1/3 HP shall be suitable for 208 volts, three-phase operation.
3. Electric heating equipment 1.5 KW and less shall be suitable for 120-volt single-phase operation. Over 1.5 KW shall be 208-volt, three-phase.
B. Power Factor: All equipment provided rated greater than 1,000 watts and lighting equipment greater than 15 watts with an inductive reactance load component shall have a power factor of not less than 90% under rated load conditions.

1.17 TEMPORARY ELECTRICAL SUPPORT FACILITIES

A. Refer to Section 01 50 00 - TEMPORARY FACILITIES.

B. Provide own field office and/or storage facilities which shall be located as directed by the Architect. Provide all tools, equipment, ladders, and temporary construction required for the execution of the work.

C. All scaffolding, ladders, and other temporary construction shall be rigidly built in accordance with all local and state requirements and shall be removed upon completion.

1.18 INSPECTIONS AND TESTS

A. Inspection: If inspection of materials installed shows defects, such as defective work, materials, and/or equipment shall be replaced and inspection and tests repeated.

B. Tests: Make reasonable tests and prove the integrity of work and leave the electrical installation incorrect adjustment and ready to operate. All panels shall have phases balanced as near as practical. A consistent phase orientation shall be adhered to at all terminations.

1.19 ENERGY REBATE PROGRAM

A. This project has been designed to incorporate equipment approved for energy rebates such as fixtures, ballasts, and lamps. File all forms required by the utility company on behalf of the Owner.

1.20 RECORD DRAWINGS

A. Refer to Section 01700 Project Closeout for additional requirements. Provide two (2) sets of the black or blue line on white drawings to maintain and submit record drawings, one set shall be maintained at the site and which shall be accurate, clear, and complete showing the actual location of all equipment as installed. Record drawings shall be updated at least monthly. Record drawings shall show outlet from which home runs are taken and location of all junction boxes and access panels. These drawings shall be available to the Architect/Engineer field representative.

B. Any addenda sketches and supplementary drawings issued during the course of construction shall be incorporated in drawings.
C. At completion, submit an accurate checked set of drawings.

D. After approval of these drawings, photo reproductions of original tracings shall be revised to incorporate changes, including addenda sketches and supplementary drawings. Fitup drawings for tenant areas shall also be revised in the same manner. These "as-built" photo reproductions shall be certified as correct and delivered to the Architect along with two (2) sets of black line prints and an Auto-CAD CD of all changes.

1.21 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS

A. Operating Instructions: Refer to Section 01700 - Furnish operating instructions to Owner's designated representative with respect to operations, functions and maintenance procedures for equipment and systems installed. Cost of such instruction up to a full three (3) days of Electrical Subcontractor's time shall be included in the contract. Cost of providing a manufacturer's representative at the site for instructional purposes shall also be included.

B. Maintenance Manuals:

1. At the completion of the project, provide four copies of complete manuals containing the following:
   a. Complete shop drawings of the equipment.
   b. Operation description of systems.
   c. Names, addresses, and telephone numbers of suppliers of systems.
   d. Vendors' P.O. numbers for equipment installed.
   e. Preventive maintenance instructions for systems.
   f. Spare parts list of system components.

2. All information shall be in one binder.

1.22 RETURN AIR PLENUM

A. All wiring above suspended ceilings shall be “UL Listed” plenum rated cable or wiring shall be installed in conduit.

1.23 TEMPORARY LIGHT & POWER

A. Refer to Section 01500– Temporary Facilities.
1.24 PHASING, DEMOLITION AND MAINTAINING EXISTING SERVICES

A. During the execution of the work, required relocation, rerouting, etc., of existing equipment and systems in the existing building areas where new work is to be installed or new connections are scheduled to be made, shall be performed by the Electrical Subcontractor, as required by job conditions and as determined by the Architect in the field, to facilitate the installation of the new system, while demolition, relocation work or new tie-ins will be performed. Outages required for construction purposes shall be scheduled for the shortest practical periods of time, in coordination with the Owner’s designated representative, for specified, mutually agreeable periods of time, after each of which the interruption shall cease and the service shall be restored. This procedure shall be repeated to suit the Owner’s working schedule, as many times as required until all work is complete. Any outages of service shall be approved by the Owner, prior to commencing the work. No outages or shutdowns of service shall occur without the written authorization of the Owner prior to commencing the work. Give notice of any scheduled shutdowns, a minimum of (2) weeks in advance. The owner shall make their best effort to meet this request without adversely affecting the electric service to the existing building.

B. Prior to any deactivation and relocation or demolition work, consult the drawings and arrange a conference with the Architect and the Owner’s representative in the field to inspect each of the items to be deactivated, removed or relocated. Care shall be taken to protect all equipment designated to be relocated and reused or to remain in operation and be integrated with the new systems.

C. Where existing outlets are to be reused and are cut off by the remodeling, they shall be reconnected to existing circuits as required by field conditions. Where existing outlets are to be abandoned, they shall be removed and blank plates installed. Each bidder shall, before submitting his bid, visit the site and make a thorough examination of the conditions in the existing buildings in order to determine the extent of the work to be done. Prior to disconnecting and removing panelboards, field confirms that it does not service areas or circuits scheduled to remain.

D. All deactivation, relocation and temporary tie-ins of electrical systems and equipment shall be provided by the Electrical Subcontractor. All demolition and removal of electrical systems and equipment designated to be demolished shall be by the Electrical Subcontractor. Stack all demolished electrical materials except hazardous materials (PCB lighting ballasts, fluorescent lamps, etc.) nearby for removal by the General Contractor. All hazardous electrical materials shall be legally disposed of by the General Contractor. The General Contractor will remove lamps and ballasts from light fixtures.
E. The Owner reserves the right to inspect the material scheduled for removal and salvage any items he deems usable as spare parts.

F. Phasing
1. The Electrical Subcontractor shall construct the subject in phases as directed by the Architect to suit the project progress schedule, as well as the completion date of the project.
2. For additional information related to phasing, review the General Conditions and Supplementary Conditions and the Architectural drawings.

PART 2 - PRODUCTS

2.1 GENERAL

A. Product specifications are written in such a manner so as to specify what materials may be used in a particular location or application and therefore does not indicate what is not acceptable or suitable for a particular location or application. As an example: nonmetallic sheathed cable is not specified; therefore, it is not acceptable.

B. For the purpose of establishing a standard of quality and not for purpose of limiting competition, the basis of this Specification is upon specified models and types of equipment and materials, as manufactured by specified manufacturers.

C. In all cases, standard cataloged materials and systems have been selected. Materials such as lighting fixtures specially manufactured for this particular project and not part of a manufacturers' standard product line will not be acceptable. In the case of systems, the system components shall be from a single source regularly engaged in supplying such systems. A proposed system made up of a collection of various manufacturers' products will be unacceptable.

D. Where Specifications list manufacturers' names and/or "as approved" or "Equal approved by Architect", other manufacturers' equipment will be considered if equipment meets Specification requirements and has all features of the specified items as are considered essential by Architect.

E. All material shall be new and shall be UL listed.
2.2 RACEWAYS AND FITTINGS

A. Raceways - General:

1. No raceway shall be used smaller than 3/4" diameter and shall have no more than four (4) 90° bends in any one run, and where necessary, pull boxes shall be provided. An only rigid metal conduit or intermediate metal conduit is allowed for slab work. Cable systems, if allowed to be used by other sections of this specification, shall not be used exposed or in slabs, whether listed by "UL" for such use or not.

2. Rigid metal conduit conforming to, and installed in accordance with, Article 344 shall be heavy wall zinc coated steel conforming to American Standard Specification C80-1 and may be used for service work, exterior work, slab work, and below grade level slab, wet locations, and in mechanical rooms for drops down to equipment from elevations below eight feet and also where raceway may be subject to mechanical damage.

3. Intermediate metal conduit conforming to, and installed in accordance with, Article 342, may be used for all applications where rigid metal conduit is allowed by these specifications except where restricted by code.

4. Electrical Metallic Tubing (EMT), conforming to, and installed in accordance with, Article 358 shall be zinc coated steel, conforming to industry standards, may be used in masonry block walls, stud partitions, above furred ceilings, where exposed but not subject to mechanical damage, and may be used for fire alarm work.

5. Surface metal raceways conforming to, and installed in accordance with, Article 386 shall be used where raceways cannot be run concealed in public spaces including corridors, offices, toilets, etc. Every effort shall be made to conceal conduits.

6. Flexible metal conduit shall be used for final connections to recessed lighting fixtures from above ceiling junction boxes and for final flexible connections to motors and other rotating or vibrating equipment. Liquid tight flexible metal conduit shall be used for the above connections which are located in moist locations. All flexible connections shall include an insulated grounding conductor.

7. Rigid nonmetallic conduit shall be used for underground electric and telephone services outside the foundation wall and shall be polyvinyl chloride (PVC) schedule 40, 90oC.

8. PVC Schedule 40 may also be used for below slab feeders and circuits within building the foundation. Below slab, rigid nonmetallic conduits do not require concrete encasement. Rigid nonmetallic conduits may also be used for exterior feeders and branch circuits. Rigid non-metallic conduits shall not be used in slabs, for elbows that penetrate slabs or thru-foundation walls. Raceways and fittings shall be produced by the same manufacturer.
9. Acceptable manufacturers:
Pittsburgh Standard Conduit Company
Republic Steel and Tube
Youngstown Sheet and Tube Company
Carlon

10. Fittings:
a. Provide insulated bushings on all raceways 1-inch diameter or larger.
b. Manufacturer’s standard fittings shall be used for raceway supports.
c. Expansion Fittings: Expansion fittings shall be used where structural and concrete expansion joints occur and shall include a ground strap.
d. Couplings for rigid metal and intermediate metal conduit shall be threaded type.
e. Threadless fittings for EMT shall be watertight compression type or set-screw type (dry-locations). All fittings shall be concrete tight. No diecast fittings allowed except for raceways larger than the 1-inch diameter.
f. The cable supports in vertical raceways shall be of the split wedge type. The armored cable supports for vertical runs to be of wire mesh basket design.
g. Wall entrance seals shall be equal to O.Z. Gedney type “WSK”.
h. Couplings, elbows and other fittings used with rigid nonmetallic conduit shall be of the solvent cemented type to secure a waterproof installation.
i. Acceptable manufacturers:
   1) O.Z.
   2) Crouse Hinds
   3) Appleton
   4) EFCOR
   5) Steel City

B. Outlets, Pull and Junction Boxes:
1. Outlets:
a. Each outlet in wiring or raceway systems shall be provided with an outlet box to suit conditions encountered. Boxes installed in normally wet locations or surface mounted shall be of the cast-metal type having hubs. Concealed boxes shall be cadmium plated or zinc coated sheet metal type. Old work boxes with Madison clamps not allowed in new construction. Thru the wall boxes are not permitted.
b. Each box shall have sufficient volume to accommodate a number of conductors in accordance with requirements of Code. Boxes shall not be less than 1-1/2" deep unless shallower boxes are required by structural conditions and are specifically approved by Architect. Ceiling and bracket outlet boxes shall not be less than 4" octagonal except that smaller boxes may be used where required by the particular fixture to be installed. Flush or recessed fixtures shall be provided with separate junction boxes when required by fixture terminal temperature requirements. Switch and receptacle boxes shall be 4" square or of comparable volume.

c. Far side box supports shall be Caddy J-1A.

d. Acceptable manufacturers:
   - Appleton
   - Crouse Hinds
   - Steel City
   - RACO

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

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

   a. Acceptable Manufacturers:
      - Hoffman
      - Keystone
      - Lee Products Co.
      - McKinstry Inc.
      - Eldon Inc.
2.3 CONDUCTORS

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

1. 208Y/120V Phase A Black
2. 208Y/120V Phase B Red
3. 208Y/120V Phase C Blue
4. Grounded Conductor 120/208 White
5. Equipment Ground 120/208 Green
6. Isolated Ground 120/208 Green with Orange Trace

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

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

1. For #10 AWG and smaller: spring type.
2. For #8 AWG and larger: circumferential compression type.
3. Acceptable manufacturers:
   3M "Scotchlock"
   IDEAL "Wingnut"
   BURNDY
   MAC
4. Any splices made up in ground-mounted pull boxes shall be resin cast waterproof type or waterproof pressure type, as manufactured by King Telecommunications, St. Louis, MO.

D. Conductors shall be copper, soft drawn, and annealed of 98% conductivity. Conductors larger than #10 AWG shall be stranded; #10 AWG and smaller shall be solid. Conductors shall be insulated for 600 volts and be of following types:

1. All conductors shall have heat/moisture resistant thermoplastic insulation type THHN/THWN (75°C) except as follows:
   a. In sizes, #1 AWG and larger: Crosslinked polyethylene insulation type XHHW (75°C - 90°C) may be used.
   b. Fire alarm system conductors shall be #14 AWG, type THHN, solid. Color coding of fire alarm conductors shall be in accordance with fire codes.
   c. Fixture whips #16AWG type "SF".
E. Stranded conductors for all wiring systems except fire alarm will be allowed if installed and terminated as specified under Execution Section.

F. Mineral-Insulated Metal-Sheathed Fire-Resistive Cables (Type MI) - Cables shall consist of a factory assembly of one or more solid copper conductors insulated with highly-compressed magnesium oxide and enclosed in a seamless, liquid-and-gas-tight continuous copper sheath. Cables shall be rated for 600 volts and less. Cables shall comply with Article 332 of the National Electrical Code. Cables shall be classified by Underwriters Laboratories, Inc. as having a 2-hour fire resistive rating. Cable terminations shall be made with UL listed mineral-insulated cable fittings. Approved Manufacturer - Pyrotenax USA, Inc. or approved equal.

G. Type MC cable may be used for concealed branch circuits and fire alarm system in hollow spaces where allowed by code and not subject to damage if installed and terminated as specified under Execution Section. Armor to be galvanized steel and shall be UL listed for 2-hour firewall penetration, equal to AFC Cable Systems of New Bedford, MA. Aluminum armor is not allowed. Fire Alarm MC Cable armor shall be red.

H. Acceptable manufacturers:
   AFC Cable Systems
   American Wire & Cable
   Cerro
   Cornish
   Crescent
   General Cable
   Okonite

2.4 ACCESS PANELS

A. Provide access panels for access to concealed junction boxes and to other concealed parts of system that require accessibility for operation and maintenance. In general, electrical work shall be laid out so access panels are not required.

B. Access panels shall be located in a workmanlike manner in closets, storage rooms, and/or other nonpublic areas, positioned so that junction can be easily reached and size shall be sufficient for the purpose (minimum size 12" x 12"). When access panels are required in corridors, lobbies, or other habitable areas, they shall be located as directed by the Architect. Submit layout and locations for approval.

C. Access panels shall be prime painted and equipped with screwdriver operated cam locks. Access panels shall be fire rated were located at fire rated walls/ceilings.
D. Acceptable manufacturers:
   Inland Steel Products Company - Milcor
   Miami Carey
   Walsh-Hannon-Gladwin, Inc. - Way Locator

   Specific types:
   1. Acoustical Tile Ceiling  "Milcor Type AT"
   2. Masonry Construction  "Milcor Type M"
   3. Drywall Construction  "Milcor Type DW"

E. Furnish access panel shop drawings.

2.5 SLEEVES, INSERTS, AND OPENINGS

A. Sleeves: Provide sleeves of proper sizes for all openings required in concrete
   floors and walls. Sleeves passing through floors shall be set with the top of
   sleeve 1" above the finished floor. Core drilling will also be acceptable if in
   accordance with any structural standards. Any unsleeved openings shall be
   waterproofed.

B. Inserts: Provide inserts or other anchoring devices in concrete and masonry
   construction as required to support raceways and equipment.

C. Openings: Where an opening is required in concrete slabs to allow passage of a
   multitude of raceways, give adequate notice to Construction Manager so he
   may box out an opening in formwork.

D. Any openings through fire-rated surfaces shall be closed off with fireproofing
   materials providing the same rating as the surface penetrated.
   Acceptable Manufacturers:
   Specified Technologies Inc.
   Thomas & Betts
   International Protective Coatings Corp.
   3M Fire Protection Products
   Dow Corning

2.6 WIRING DEVICES

A. Receptacles: Receptacles shall be flush mounted. All standard 20-ampere
   devices to be of the same manufacturer.

   Acceptable Manufacturers:
   Twenty (20) ampere duplex grounding type NEMA 5-20R,
   Cooper 5362-V,
   Hubbell 5362I,
   Pass and Seymour 5362I,
Leviton 5362-I
Thirty (30) amperes, 250 volt NEMA 14-30R complete with plate,
Cooper 1257,
Hubbell 9430-A,
Pass and Seymour 3864

B. Switches: 20 ampere,
Cooper CWD-2221,
Hubbell 1221,
Pass and Seymour 20AC-2,
Leviton 1221.
Prewired devices with pigtails acceptable

C. Composition material of wiring devices to be nylon with an ivory finish. Outlets on computer circuits shall be gray.

D. Cover plates: Brushed US 302 stainless steel
Provide gaskets on all wiring device plates where devices are on walls separating conditioned and nonconditioned spaces.

E. Dimmer Controls:
1. All devices shall be UL listed specifically for the required loads (i.e., incandescent, fluorescent, magnetic low voltage, electronic low voltage). The manufacturer shall provide file card upon request. Universal dimmers are not acceptable.
2. All dimmers and switches shall incorporate an air gap switch. The air gap switch shall be capable of meeting all applicable requirements of UL 20 for air gap switches on incandescent dimmers.
3. All dimmers and switches shall provide power-failure memory. Should power be interrupted and subsequently returned, the lights will come back on to the same levels set prior to the power interruption. Restoration to some other default level is not acceptable.
4. Dimmers and switches shall meet ANSI/IEEE Std. C62.41-1980, tested to withstand voltage surges of up to 6000V and current surges of up to 200A without damage.
5. Dimmers and switches shall meet the UL 20 limited short circuit test requirement for snap switches.
6. Dimmer shall provide a smooth and continuous Square Law dimming curve.
7. Dimmers shall be voltage regulated so that +10 percent variation in line voltage shall cause not more than +5 percent variation in load voltage when the dimmer is operating at 40V (5 percent light output).
8. Dimmers, where ganged, shall be derated in accordance with manufacturer's instructions. Ratings in watts listed on the drawings are the derated ratings. Minimum size dimmer shall be 1500 watts.
9. Dimmers shall be Lutron, Lightolier, Leviton or equal.
F. Exterior Outlets with Lockable Covers and outlets within 6’ of water.
   1. Provide exterior outlets with lockable covers at all exterior outlet locations. Provide Hubbell Cat #5752-0 weatherproof locking covers. Provide ground fault interrupter type receptacles within 6’ of water and as indicated on drawings.

2.7 LIGHTING FIXTURES

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

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

C. LED Assemblies
   1. LED luminaires shall conform to UL 1598 and to UL 8250 – Safety Standard for Light-Emitting Diode (LED) Light Sources for Use in Lighting Products.
   2. Products shall be lead and mercury free.
3. Photometric characteristics shall be established using IESNA LM-79-08, IESNA Approved Method for the Electrical and Photometric Measurement of Solid-State Lighting Products.
4. Color characteristics of LED luminaires shall be as follows in accordance with ANSI C78.377 – Specifications for the Chromaticity of Solid State Lighting Products.
5. LED and driver cooling system shall be passive and shall resist the buildup of debris.
6. LED luminaire output after 50,000 hours of operation shall be not less than 70 percent of the initial lumen output when determined in accordance with IESNA LM-80-08 – IESNA Approved Method for Measuring Lumen Maintenance of LED Lighting Sources.
7. LED source package electrical characteristics:
   a. Supply voltage: 120 V, 208 V, 240 V, 277 V, or 480 V as indicated on the Drawings. Provide step-down transformers if required to match driver input voltage rating.
   b. Total harmonic distortion (current): Not more than 10 percent
   c. Power factor: Not less than 90 percent
   d. RF interference: Meet FCC 47 CFR Part 15/18
   e. Transient protection: IEEE C62.41 Class A.

D. Extra Materials
1. Furnish the following extra materials matching products installed. Package with protective covering for storage and identify with labels describing contents.
   a. One (two percent of the quantity of LED drivers of each type, but not less than one of each type).

E. Interior General:
1. Furnish interior luminaries that comply with requirements specified below, indicated on the Drawings, and as required to meet conditions of installation.
2. Metal parts shall be free from burrs and sharp corners and edges.
3. Metal components shall be formed and supported to prevent sagging and warping.
4. Steel parts shall be finished with manufacturer's standard finish applied over a corrosion-resistant primer. Finish shall be free from runs, streaks, stains, holidays or defects.
5. Doors and frames shall be smooth operating and free from light leakage under operating conditions. Relamping shall be possible without the use of tools. Doors, frames, lenses, and diffusers shall be designed to prevent accidental falling during relamping and when secured in the operating position.
6. Luminaires shall have minimum reflecting surface reflectance as follows unless specified otherwise on the Drawings:
   a. White Surfaces: 85 percent
   b. Specular Surfaces: 83 percent
   c. Diffusing Specular Surfaces: 75 percent

7. Lenses, diffusers, covers, and globes shall be 100 percent virgin acrylic unless specified otherwise on the Drawings. Lenses shall have 0.125 inches minimum thickness. Lenses for fluorescent troffers shall be injection molded.

8. Luminaires shall conform to UL 1598 - Luminaires. Provide product with damp location listing or wet location listing as required by installation location.

F. Interior Accessories
1. Provide stud supports, mounting brackets, frames, plaster rings and other accessories required for luminaire installation.
2. Furnish hangers as specified below and as required by conditions of installation:
   a. Stem hangers shall be made of 1/2-inch steel tubing with 45 degrees swivel ball hanger fitting and ceiling canopy. Finish the same as the luminaire.
   b. Rod hangers shall be made of 1/4 inch threaded zinc-plated steel rod.
   c. For HID luminaires provide hook hangers that are integrated assemblies matched to the luminaire and line voltage; equip with threaded attachment, power cord and locking type plug. Provide a safety chain or cable for each luminaire that will attach to the building structure, the ballast housing, and to the reflector/diffuser assembly.
3. Use NRTL-listed T-bar safety clips for lay-in luminaires.
4. Where indicated on the Drawings or where lamp breakage is detrimental, such as above food counters, provide open fluorescent luminaires with:
   a. Self-locking sockets or lamp retainers, two per lamp, and clear polycarbonate protective lamp sleeves with end caps over each lamp. The sleeve shall have a light transmission of 95 percent and shall be rated for the thermal profile of the lamp and ballast.

G. Interior Installation
1. Install an interior lighting system in accordance with the NEC, manufacturer's installation instructions approved shop drawings, and NECA National Electrical Installation Standards.
2. Have the manufacturer's installation instructions available at the Project site.
3. Mounting heights specified or indicated on the Drawings are to the bottom of the luminaire for ceiling-mounted fixtures and to the center of the luminaire for wall-mounted fixtures.

4. Where the ceiling forms the protective membrane of a fire resistive assembly, install protective coverings over luminaires in accordance with NRTL requirements.

5. Install slack safety wires as described below for luminaires in or on suspended ceilings.
   a. Wire shall be minimum 12 gauge galvanized soft annealed steel wire conforming to ASTM A641.
   b. Attach the wire to the building structure directly above the attachment point on the box or luminaire; make trapezes of framing channel material as required to span obstacles.
   c. Secure wire(s) at each end with not less than three tight turns in 1-1/2 inches.

6. Support pendant-mounted or cable-supported luminaires directly from the structure above using a 9 gauge wire or approved alternate support without using the ceiling suspension system for direct support.
   a. Install seismic restraints for pendant-mounted and cable-supported luminaires.
   b. Pendants, rods, cables, or chains 4 ft or longer shall be braced to prevent swaying using three cables at 120 degrees separation.

7. Connect luminaires in suspended ceilings using 6 ft. lengths of flexible wiring method arranged to accommodate not less than 4 inches of differential seismic movement in any direction.

H. Interior Quality Control
   1. Make electrical connections, clean interiors and exteriors of luminaires, install lamps, energize and test luminaires, inspect interior lighting system, and deliver spare parts in accordance with manufacturer's instructions and NECA National Electrical Installation Standards.
   2. Test electronic dimming ballasts for full range dimming capability.
      a. Burn-in dimmer controlled fluorescent lamps at full output for not less than 100 hours before dimming.
      b. Check for visually detectable flicker over the full dimming range.
   3. Prior to turnover to Owner, replace lamps that were installed and used during construction if more than 15 percent of their rated lamp life has been used.

I. Exterior - General
   1. Furnish exterior luminaires that comply with requirements specified in this Section and in the luminaire schedule on the Drawings.
   2. Luminaire photometric characteristics shall be based on IESNA approved methods for photometric measurements performed by a recognized photometric laboratory.
3. Luminaire housing shall be primarily metal.
   a. Metal parts shall be free from burrs and sharp corners and edges.
   b. Sheet metal components shall be fabricated from corrosion-resistant aluminum, formed and supported to prevent sagging and warping.
   c. Exposed fasteners shall be stainless steel.
4. Doors and frames shall be smooth operating and free from light leakage under operating conditions.
   a. Relamping shall be possible without the use of special tools.
   b. Doors, frames, lenses, and diffusers shall be designed to prevent accidental falling during relamping and when secured in the operating position.
   c. Door shall be removable for cleaning or replacing the lens.
5. Luminaires shall have minimum reflecting surface reflectance as follows unless scheduled otherwise:
   a. White surfaces: 85 percent
   b. Specular surfaces: 83 percent
   c. Diffusing specular surfaces: 75 percent
6. Provide lenses, diffusers, covers, and globes as scheduled on the Drawings fabricated from materials that are UV stabilized to be resistant to yellowing and other changes due to aging or exposure to heat and ultraviolet radiation.
7. Doors shall have resilient gaskets that are heat-resistant and aging-resistant to seal and cushion lens and refractor.

2.8 ELECTRICAL POWER EQUIPMENT

A. Motor Controls - Manual and Magnetic:
   1. Individually-mounted magnetic starters shall be NEMA rated across-the-line type with thermal overload on each phase, single-speed, two-speed, or reduced voltage start as indicated.
   2. Motor Starters shall be furnished by Electrical Sub-Contractor unless part of package mechanical equipment such as rooftop units.
   3. Starters shall be of maintained contact type, of size and type required for particular motor horsepower and voltage. Minimum size starter to be size 1 FVNR unless noted otherwise.
      a. Starters shall have OL reset button, green push-to-test type pilot light to indicate "ON", and "HAND-OFF-AUTO" switch in cover.
      b. Starters to have 120-volt control transformers with the fused output being provided for those units operating on 277/480 volt system.
      c. Provide Class 20 fixed heater overloads with auto/manual reset.
      d. Provide four (4) sets of auxiliary contacts of convertible type N.O. to N.C. for each starter.
e. Motor starters shall have NEMA I enclosures. Those in wet locations shall be NEMA 3R.
f. Acceptable Manufacturers:
   Westinghouse
   Square D/Groupe Schneider
   Siemens
   Allen Bradley
   General Electric

4. Manual motor starters shall have pilot lights and shall be furnished with thermal overloads on each phase.

B. Motors: Each motor shall have a disconnect switch and starter provided under this section.
   1. Provide motor terminal boxes for each motor not furnished with same.

C. Disconnect Switches:
   1. Disconnect (safety) switches shall conform to industrial standards of NEMA, be UL listed and shall be heavy duty type, quick-make, quick-break type with interlocking cover mechanism and provisions for padlocking switch handle in "OFF" position. Three pole toggle switches are not acceptable as a substitute for disconnect switches.
   2. Disconnect switches shall be of the fused or unfused type as indicated with a number of disconnecting poles indicated. The grounded conductor shall not be switched. Switches for use with current limiting fuses shall be rejection type and those used in conjunction with motors shall be horsepower rated. Provide oversize termination lugs if required by conductor size.
   3. Enclosures shall be of proper NEMA type for intended location and shall be phosphate coated or equivalent code gauge galvanized sheet steel with ANSI #24 dark gray baked enamel finish.
   4. Acceptable Manufacturers:
      Westinghouse
      Square D/Groupe Schneider
      Siemens
      Allen Bradley

D. Fuses:
   1. Provide a complete set of fuses for each item of fusible type equipment.
   2. Turn over to an authorized representative of Owner upon completion a spare set of fuses of each different type and ampere rating installed. These spares shall be bound with twine and tagged.
   3. Secondary system fuses, rated at 600 volts or less, shall be UL listed and constructed in conformance with the applicable standards set forth by NEMA and ANSI. All fuses of a particular class shall be of the same manufacturer.
4. All fuses in distribution panelboards and switchboards shall be class "L" above 600 amperes and class "RK1" for 600 amperes and below.

5. Main, Feeder, and Branch Circuits:
   a. Circuits 601 amperes and above shall be protected by (Bussmann type KRP-C LOW-PEAK) current limiting time delay fuses.
   b. Circuits 0-600 amperes shall be protected by (Bussmann "LOW-PEAK" dual element), time delay current limiting fuses, LPN-RK (250 volts), LPS-RK (600 volts), UL class RK-1.

6. Acceptable Manufacturers:
   Bussmann, Division of McGraw
   Gould/Shawmut
   GEC-ALSTHOM

2.9 ELECTRICAL SYSTEM CONTROLS AND INSTRUMENTS

A. Provide a complete power system consisting of branch circuits, motor disconnect switches, pushbutton stations, motor starters, and other devices to connect up and leave in operating condition each piece of electrically operated equipment provided either under this section or other Divisions.

B. All control wiring, not indicated in the electrical specifications or not shown on electrical drawings, will be provided by Temperature Control Subcontractor.

2.10 GROUNDING SYSTEM

A. All equipment and systems shall be grounded. Refer especially to NEC Section 250 Requiring Connections to Building Steel, Foundation, Water Service, and Interior Piping. Provide transformer pad grounding in accordance with utility company standards.

B. The grounded conductor shall be supplemented by an equipment grounding system.

C. The equipment grounding system shall be installed so all conductive items in close proximity to electrical circuits operate continuously at ground potential and provide a low impedance path for ground fault currents.

D. Grounding conductors shall be so installed as to permit shortest and most direct path to ground.
E. Maximum measured resistance to ground of 5.0 ohms shall not be exceeded. Ground separately derived systems (dry type transformers) in accordance with Article 250-26 by grounding neutral to transformer ground lug and providing insulated grounding electrode conductor to nearest effectively grounded building a steel or, if unavailable, to nearest available effectively grounded metal water pipe.

F. Equipment grounding conductors and straps shall be sized in compliance with Code Table 250.

G. Grounding conductors shall be insulated with green color. Grounding conductors for use on isolated ground receptacles shall be green with trace color to differentiate between normal ground conductors.

H. Branch circuits shall consist of phase and grounded conductor installed in common metallic raceway. All circuits shall have a separate insulated grounding conductor installed. Any flexible cable system or nonmetallic raceway system shall have an insulated grounding conductor. Any cable system for use on isolated ground circuits shall have both an isolated ground conductor as well as an equipment ground conductor, both of which shall be insulated.

I. Each electrical expansion fitting shall be furnished with a bonding jumper. Provide grounding bushings and ground connections for all raceways terminating below equipment where there is no metal-to-metal continuity.

J. Continuity between all metallic and nonmetallic raceway systems and equipment shall be maintained.

K. Outdoor lighting fixtures shall be grounded and bonded in common with building system via a separate grounding conductor.

2.11 PANELBOARDS

A. Panelboards shall be dead-front, a door in door safety type equipped with single or multi-pole circuit breakers suitable for 120/208 volt, 3 phase, 4 wire operation.

B. Buses shall be copper. Panelboards shall have a circuit directory card mounted in a frame with plastic cover on the inside of the door. Panelboards to have a copper ground bus with terminals for each circuit. Panelboards serving isolated ground receptacles shall have a separate ground bus for terminations of the isolated grounds. The isolated ground bus shall be mounted to the panel tub via non-conducting means with a separate grounding conductor run to the normal panel ground bus. Provide oversize lugs for any termination requiring same due to oversize conductors. Provide 200% neutral buses on all 120/208 volt panelboards feeding receptacles.
C. Cabinets shall be a minimum of 20 inches wide and be made of code gauge steel. Surface type shall be ordered without knockouts.

D. Trims shall be made of code gauge steel, surface or flush as indicated. Panelboards shall be keyed alike. Trims shall be provided with the full-length piano hinge on one side and secured to the tub with sufficient quantity of latches opposite the hinge side to allow the trim to fit flush with tub and when released, allow full access to wiring gutters. Inner door shall allow access to circuit breakers only.

E. Panelboards shall be of the following types with minimum circuit breaker frame sizes listed below. Refer to schedules for larger circuit breaker frame sizes due to fault current availability.

1. 120/208 volt, three-phase, four wire. Symmetrical interrupting capacity 42,000 AIC.
   - Westinghouse type PRL-1 BAB Breakers (bolt-on)
   - Square D type NQOD QOB Breakers (bolt-on)
   - Siemens type CDP-7 BQ Breakers (bolt-on)
   - General Electric type AQ HHQB Breakers (bolt-on)

2. Distribution Panels:
   a. Where scheduled as circuit breaker type, symmetrical interrupting capacity 42,000 AIC.
      - Westinghouse type PRL-3 FD Breakers
      - Square D I-Line type FA Breakers
      - Siemens SPP FXD6 Breakers
      - General Electric Spectra THED Breakers
   b. Where scheduled as fusible type,
      - Westinghouse type PRL-4F 36"width minimum
      - Square D type QMB 35"width minimum
      - Siemens FPP type 38"width minimum
      - General Electric type ADS 35"width minimum
   c. Provide electrical metering and voltage protection system equal to Square D Power Logic, Westinghouse/Cutler Hammer IQ Data Plus or Siemens 4700 Series at the main breaker.
d. Include provisions for Utility Co. Metering. Refer to the Electric Service Section of this Division.

F. Panelboards and distribution panels shall be of the same manufacturer.

2.12 FIRE ALARM AND DETECTION SYSTEM

A. Description:

1. This section of the specification includes the furnishing, installation, connection and testing of the microprocessor controlled, intelligent reporting fire alarm network equipment required to form a complete, operative, coordinated system. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, Network Fire Alarm Control Panel (FACP), auxiliary control devices, annunciators, and wiring as shown on the drawings and specified herein.

2. The fire alarm system shall comply with requirements of latest NFPA Standard 72 for Protected Premises Signaling Systems except as modified and supplemented by this specification. The system shall be electrically supervised and monitor the integrity of all conductors.

3. The fire alarm manufacturer shall be of the highest caliber and insist on the highest quality. The system shall be manufactured by an ISO 9001 certified company and meet the requirements of BS EN9001: ANSI/ASQC Q9001-1994.

4. The FACP and peripheral devices shall be manufactured 100% by a single U.S. manufacturer (or division thereof).

5. The system and its components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for fire alarm applications and shall be in compliance with the UL listing.

6. The installing company shall employ NICET (minimum Level II Fire Alarm Telecommunications) technicians on site to guide the final check-out and to ensure the integrity of the system.

B. Scope:

1. A new network intelligent reporting, microprocessor controlled fire detection and alarm system shall be installed in accordance with the specifications and drawings.

2. Basic Performance:

   a. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded onto NFPA Style 7 (Class A) Signaling Line Circuits (SLC).

   b. Initiation Device Circuits (IDC) shall be wired Class A (NFPA Style D).

   c. Notification Appliance Circuits (NAC) shall be wired Class A (NFPA Style Z).

   d. Digitized electronic signals shall employ check digits or multiple polling.
e. Power for initiating devices and notification appliances must be from the main fire alarm control panel.

f. A single ground or open on any system signaling line circuit, initiating device circuit, or notification appliance circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.

g. Alarm signals arriving at the main FACP shall not be lost following a power failure (or outage) until the alarm signal is processed and recorded.

3. Basic System Functional Operation:
When a fire alarm condition is detected and reported by one of the systems initiating devices or appliances, the following functions shall immediately occur:

a. The FACP alarm LED on the FACP shall flash.
b. A local piezo-electric signal in the FACP control panel shall sound.
c. The 80-character LCD display on the local FACP node and on the intelligent network display shall indicate all information associated with the fire alarm condition, including the type of alarm point, and its location within the protected premises. This information shall also be displayed on the network reporting terminal.
d. Printing and history storage equipment shall log the information associated with the fire alarm control panel condition, along with the time and date of occurrence.
e. All system output programs assigned via control-by-event interlock programming to be activated by the particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated on either local outputs or points located on other network nodes.

4. Software Modifications:
a. Provide the services of a factory trained and authorized the technician to perform all system software modifications, upgrades or changes. Response time of the technician to the site shall not exceed 4 hours.
b. Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm network on site. The modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site. Modification of software shall not require power-down of the system or loss of system fire protection while modifications are being made.

5. Certifications:

Together with the shop drawing submittal, submit a certification from the major equipment manufacturer indicating that the proposed supervisor of installation and the proposed performer of contract maintenance is an authorized representative of the major equipment manufacturer and trained on network applications. Include names and addresses in the certification.

a. Power supplies, relays, water flow switches and all accessories of the fire alarm system.
b. Each circuit in the fire alarm network shall be tested semiannually.
c. Each smoke detector shall be tested in accordance with the requirements of NFPA 72, Chapter 7.

C. Applicable Publications:

The publications listed below form a part of this specification. The publications are referenced in the text by the basic designation only.

1. National Fire Protection Association (NFPA) - USA:

   No. 72  National Fire Alarm Code
   No. 70  National Electric Code
   No. 101 Life Safety Code

2. Underwriters Laboratories Inc. (UL) - USA:

   No. 50  Cabinets and Boxes
   No. 268 Smoke Detectors for Fire Protective Signaling Systems
   No. 864 Control Units for Fire Protective Signaling Systems
   No. 268A Smoke Detectors for Duct Applications
No. 521  Heat Detectors for Fire Protective
     Signaling Systems
No. 228  Door Closers-Holders for
     Fire Protective Signaling Systems
No. 464  Audible Signaling Appliances
No. 38   Manually Actuated Signaling Boxes
No. 346  Waterflow Indicators for
     Fire Protective Signaling Systems
No. 1481 Power supplies for Fire
     Protective Signaling Systems
No. 1076 Control Units for Burglar Alarm
     Proprietary Protective Signaling Systems
No. 1971 Visual Notification Appliances

3. Local and State Building Codes.
4. All requirements of the Authority Having Jurisdiction (AHJ).

D. Approvals:

1. The system must have a proper listing and/or approval from the
   following nationally recognized agencies:

   UL   Underwriters Laboratories Inc.
   FM   Factory Mutual
   MEA  Material Equipment Acceptance (NYC)
   CSFM California State Fire Marshal

2. The fire alarm control panel shall meet the modular labeling
   requirements of Underwriters Laboratories, Inc. Each subassembly,
   including all printed circuits, shall include the appropriate UL modular
   label. Systems which do not include modular labels which may require a
   return to the manufacturer for system upgrades, and are not
   acceptable.

E. Equipment and Material, General:

1. All equipment and components shall be new, and the manufacturer's
   current model. The materials, appliances, equipment, and devices shall
   be tested and listed by a nationally recognized approvals agency for use
   as part of a protected premises protective signaling (fire alarm) system.
   The authorized representative of the manufacturer of the major
   equipment, such as control panels, shall be responsible for the
   satisfactory installation of the complete system.

2. All equipment and components shall be installed in strict compliance
   with each manufacturer's recommendations. Consult the
   manufacturer's installation manuals for all wiring diagrams, schematics,
   physical equipment sizes, etc. before beginning system installation.
   Refer to the riser/connection diagram for all specific system
   installation/termination/wiring data.
3. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place. (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

F. Conduit and Wire:
1. Conduit:
   a. Conduit shall be in accordance with the National Electrical Code (NEC), local and state requirements.
   b. All wiring exposed shall be installed in conduit. All wiring exposed in finish spaces shall be in the surface metal raceway. Conduit fill shall not exceed 40 percent of the interior cross-sectional area where three or more cables are contained within a single conduit.
   c. The 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, per NEC Article 760-29.
   d. Wiring for 24-volt control, alarm notification, emergency communication, and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.
   e. Conduit shall not enter any FACP, or any other remotely mounted control panel equipment or backboxes, except where conduit entry is specified by the FACP manufacturer.
   f. Conduit shall be 3/4 inch (19.1 mm) minimum.
2. Wire:
   a. All fire alarm system wiring must be new unless specified herein.
   b. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 16 AWG (1.02 mm) for initiating device circuits and signaling line circuits, and 14 AWG (1.32 mm) for notification appliance circuits.
   c. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.
   d. Wiring used for the SLC multiplex communication loop shall be twisted and shielded unless specifically excepted by the fire alarm equipment manufacturer.
   e. All field wiring shall be completely supervised.
f. MC cable with red armor may be used where concealed and allowed by code.

3. Terminal Boxes, Junction Boxes, and Cabinets:
4. All boxes and cabinets shall be UL listed for the intended purpose.
5. Initiating circuits shall be arranged to serve like categories (manual, smoke, water flow). Mixed category circuitry shall not be permitted except on signaling line circuits connected to intelligent reporting devices.
6. The FACP shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the main power distribution panel as FIRE ALARM. Fire alarm control panel primary power wiring shall be 12 AWG. The FACP cabinet shall be grounded securely to either a cold water pipe or a grounding rod. Provide a lock-on device on the breaker

G. Fire Alarm Control Panel:
1. Fire alarm control panel shall be Notifier Model No. NFS 640 Series or approved equal and shall contain a microprocessor-based central processing unit (CPU). Edwards, FCI, and Siemens are considered equals. The FACP shall communicate with and control the following types of equipment used to make up the system: intelligent detectors, addressable modules, local and remote operator terminals, annunciators, and other system controlled devices.
2. Node Capacity and General Operation:
   a. Each node shall provide, or be capable of, expansion to 198 intelligent addressable devices and 198 monitors/control modules for a total of 396 intelligent devices per system. FACP shall have 2 intelligent loops.
   b. Each FACP node shall include a full-featured operator interface to control and annunciation panel which shall include a backlit Liquid Crystal Display (LCD), individual, color-coded system status LEDs, and an alpha-numeric keypad for field programming and control of the node.
   c. All programming or editing of the existing programming the system shall be achieved without special equipment or interrupting the alarm monitoring functions of the fire alarm control panel.
   d. Each FACP node shall provide the following features:

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### Loop Interface Board (LIB):

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3. Loop Interface Board (LIB):
   
a. Loop interface boards shall be provided to monitor and control each of the Signaling Line Circuit (SLC) loops in the network node. The loop interface board shall contain its own microprocessor and shall be capable of operating in local mode in the case of a failure in the main CPU of the control panel. In local mode, the loop interface board shall detect alarms and activate output devices on its own SLC loop.

b. The LIB shall not require any jumper cuts or address switch settings to initialize SLC Loop operations.

c. The loop interface board shall provide power to, and communicate with, all of the intelligent detectors and addressable modules connected to its SLC Loop over a single pair of wires. This SLC Loop shall be capable of operation as NFPA Style 4, Style 6, or Style 7.

d. The LIB shall be able to drive two Style 4 SLC loops, each up to 10,000 feet in length, for an effective loop span of 20,000 feet.

e. The loop interface board shall receive analog information from all intelligent detectors and shall process this information to determine whether normal, alarm, or trouble conditions exist for that particular detector. The loop interface board software shall include software to automatically adjust and compensate for dust accumulation to maintain detector performance as it is affected by environmental factors. The analog information may also be used for automatic detector testing and for the automatic determination of detector maintenance requirements.

f. The LIB shall communicate with each intelligent addressable detector and addressable module on its SLC loop and verify proper device function and status. Communication with up to 198 intelligent devices shall be performed every 6 seconds or less.
4. Enclosures:
   a. Control panels shall be housed in UL listed cabinets suitable for surface or semi-flush mounting. Cabinets shall be corrosion protected, given a rust-resistant prime coat, and the manufacturer's standard finish.
   b. The back box and door shall be constructed of .060 steel with provisions for electrical conduit connections into the sides and top.
   c. The door shall provide a key lock and include a transparent opening for viewing all indicators. For convenience, the door shall have the ability to be hinged on either the right or left-hand side.
   d. The control unit shall be modular in structure for ease of installation, maintenance, and future expansion.

5. FACP nodes shall be designed so that it permits continued local operation of remote transponders under both normal and abnormal network communication loop conditions. This shall be obtained by having transponders operate as local control panels upon loss of network communication.

6. FACP nodes shall be modular in construction to allow ease of service. Each CPU and transponder shall be capable of being programmed on site without requiring the use of any external programming equipment. Systems which require the use of external programmers or change of EPROM’s are not acceptable.

7. The CPU and associated equipment are to be protected so that they will not be affected by voltage surges or line transients including RFI and EMI.

8. Each peripheral device connected to the FACP node CPU shall be continuously scanned for proper operation. Data transmissions between network nodes, FACP CPUs, transponders, and peripheral devices shall be reliable and error-free. The transmission scheme used shall employ dual transmission or other equivalent error checking techniques. Failure of any transponder or peripheral device to respond to an interrogation shall be annunciated as a trouble condition.

9. FACP Power Supplies:
   a. Main power supplies shall operate on 120 VAC, 60Hz, and shall provide all necessary power for the FACP.
   b. Each main supply shall provide 3.0 amps of usable notification appliance power, using a switching 24 VDC regulator.
   c. The main power supply shall be expandable for additional notification appliance power in 3.0-ampere steps. Provide dedicated power supplies for the signal circuit.
d. Each main power supply shall provide a battery charger for 60 hours of standby using dual-rate charging techniques for fast battery recharge. It shall charge 55 Amp hour batteries with-in a 48 hour period.

e. The supply shall provide a very low-frequency sweep earth detect circuit, capable of detecting earth faults on sensitive addressable modules.

f. It shall provide meters to indicate battery voltage and charging current.

g. The main power supply shall be power-limited per 1995 UL864 requirements.

10. System Circuit Supervision:
   a. Each FACP node shall supervise all circuits to intelligent devices, transponders, annunciators, and peripheral equipment and annunciate loss of communications with these devices. The FACP CPU shall continuously scan the above devices for proper system operation and upon loss of response from a device shall sound audible trouble, indicate which device or devices are not responding and print the information on the printer.

   b. Sprinkler system valves, standpipe control valves, PIV, and main gate valves shall be supervised for the off-normal position.

11. Field Wiring Terminal Blocks:
   a. For ease of service, all wiring terminal blocks shall be the plug-in type and have sufficient capacity for 18 to 12 AWG wire. Fixed terminal blocks are not acceptable.

12. Field Programming:
   a. The system shall be programmable, configurable and expandable in the field without the need for special tools or electronic equipment and shall not require field replacement of electronic integrated circuits.

   b. All local FACP node programming shall be accomplished through the FACP keyboard.

   c. All field-defined programs shall be stored in non-volatile memory.

   d. The programming function shall be enabled with a password that may be defined specifically for the system when it is installed. Two levels of password protection shall be provided in addition to a key-lock cabinet. One level is used for status level changes such as zone disable or manual on/off commands. A second (higher-level) is used for the actual change of program information.
13. **Specific System Operations:**
   a. **Smoke Detector Sensitivity Adjust:** Means shall be provided for adjusting the sensitivity of any or all analog intelligent detectors in the FACP node from each system keypad or from the keyboard of the video terminal. Sensitivity range shall be within allowed UL limits.
   b. **Alarm Verification:** Each of the intelligent addressable detectors in the system may be independently selected and enabled for alarm verification. Each FACP shall keep a count of the number of times each detector has entered the verification cycle. These counters may be displayed and reset by the proper operator commands.

14. **System Point Operations:**
   a. All devices in the FACP node may be enabled or disabled through the local keypad or video terminal.
   b. Any FACP node output point may be turned on or off from the local system keypad or the video terminal.
   c. **Point Read:** The FACP node shall be able to display the following point status diagnostic functions without the need for peripheral equipment. Each point will be annunciated for the parameters listed:
      1) Device Status
      2) Device Type
      3) Custom Device Label
      4) Software Zone Label
      5) Device Zone Assignments
      6) Detector Analog Value
      7) II Program Parameters
   d. **System Status Reports:** Upon command from a password-authorized operator of the system, a status report will be generated, and printed, listing all local FACP system status.
   e. **System History Recording and Reporting:** Each FACP node shall contain a history buffer that shall be capable of storing a minimum of 400 system events. Each local activation will be stored and time and date stamped with the actual time of the activation until an operator requests that the contents be either displayed or printed. The contents of the history buffer may be manually reviewed, one event at a time, and the actual number of activations may also be displayed and or printed.

   The history buffer shall use non-volatile memory. Systems which use volatile memory for history storage are not acceptable.
f. Automatic Detector Maintenance Alert: Each FACP node shall automatically interrogate each intelligent system detector and shall analyze the detector responses over a period of time.

If any intelligent detector in the system responds with a reading that is below or above normal limits, then the system will enter the trouble mode, and the particular intelligent detector will be annunciated on the system display, network display and printed on the optional system printer. This feature shall in no way inhibit the receipt of alarm conditions in the system, nor shall it require any special hardware, special tools or computer expertise to perform.

H. Addressable Devices – General:
1. Addressable devices shall use simply to install and maintain decade (numbered 1 to 10) type address switches.
2. Addressable devices which use a binary address setting method, such as a Dip switch, are difficult to install and subject to installation error. This type of device is not an allowable substitute.
3. Detectors shall be intelligent (analog) and addressable and shall connect with two wires to the FACP signaling line circuit.
4. Addressable smoke and thermal detectors shall provide dual alarm and power/polling LEDs. Both LEDs shall flash under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady illumination by the control panel, indicating that an alarm condition has been detected. If required, the LED flash shall have the ability to be removed from the system program. An output connection shall also be provided in the base to connect an external remote alarm LED.
5. Smoke detector sensitivity shall be set in the fire alarm control panel and shall be adjustable in the field through the field programming of the system. Sensitivity may be automatically adjusted by the panel on a time-of-day basis.
6. Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72, Chapter 7.
7. The detectors shall be ceiling-mount and shall include a separate twist-lock base with the tamper-proof feature. The base shall include a sounder base with a built-in (local) sounder rated at 85 DBA minimum, a relay base and an isolator base designed for Class A applications.
8. The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a magnetic switch) or initiated remotely on command from the control panel.
9. Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (ION, PHOTO, THERMAL).

10. Detectors will operate in an analog fashion, where the detector simply measures its designed environment variable and transmits an analog value to the FACP based on real-time measured values. The FACP software, not the detector, shall make the alarm/normal decision, thereby allowing the sensitivity of each detector to be set in the FACP program and allowing the system operator to view the current analog value of each detector.

11. A magnetic test switch shall be provided to test each detector for 100% obscuration, reported to the FACP.

12. Addressable devices shall provide address-setting means using decimal switches and shall also store an internal identifying code that the control panel shall use to identify the type of device. LED(s) shall be provided that shall flash under normal conditions, indicating that the device is operational and is in regular communication with the control panel.

13. A magnetic test switch shall be provided to test detectors and modules. Detectors shall report an indication of an analog value reaching 100% of the alarm threshold.

I. Addressable Pull Box (manual station):

1. Addressable pull boxes shall, on command from the control panel, send data to the panel representing the state of the manual switch and the addressable communication module status. They shall use a key operated test-reset lock, and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.

2. All operated stations shall have a positive, visual indication of operation and utilize a key type reset.

3. Manual stations shall be constructed of Lexan with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters, 1.75 inches or larger.

4. Stations shall be suitable for surface mounting or semiflush mounting as shown on the plans, and shall be installed not less than 42 inches, nor more than 48 inches above the finished floor.

5. Manual pull stations shall be of the double action type.

J. Intelligent Photoelectric Smoke Detector:

1. The detectors shall use the photoelectric (light-scattering) principal to measure smoke density and shall, on command from the control panel, send data to the panel representing the analog level of smoke density.
K.** Intelligent Thermal Detectors:**
   1. Thermal detectors shall be intelligent addressable devices rated at 135 degrees Fahrenheit (58 degrees Celsius) and have a rate-of-rise element rated at 15 degrees F (9.4 degrees C) per minute. It shall connect via two wires to the fire alarm control panel signaling line circuit. Up to 99 intelligent heat detectors may connect to one SLC loop.

L. **Intelligent Duct Smoke Detector:**
   1. The in-duct smoke detector housing shall accommodate either an intelligent ionization detector or an intelligent photoelectric detector, of that provides continuous analog monitoring and alarm verification from the panel.
   2. When sufficient smoke is sensed, an alarm signal is initiated at the FACP, and appropriate action taken to change over air handling systems to help prevent the rapid distribution of toxic smoke and fire gases throughout the areas served by the duct system.

M. **Duct mounted carbon monoxide detector:**
   1. Manufactured by Air Products and Controls Model SL-701 or Equal
   2. Product Specifications

| Voltages available:       | 230VAC, 115VAC, 24VAC, 24VDC |

**APPROVALS**
- Electrochemical Carbon Monoxide Sensor is a UL Recognized component in accordance with the requirements of UL2034. Also meets EN50291 requirements.
- SL-2000 Series Duct Smoke Detector Fire Alarm Certifications referenced side one:
  - UL & CUL Listed (UL268A, UROX, UROX7) File # S2829 CSFM Listed (3240-1004:105); MEA Accepted (73-92-E, VOL. 27)

**SAMPLING TUBES**
- Provide required length for duct coordinate with HVAC drawings
- Sectional sampling tube
- Metal sampling tube for 6” to 2.5’ duct width
- Metal sampling tube for 2.5’ to 5.0’ duct width
- Metal sampling tube for 5.0’ to 10.0’ duct width

**ACCESSORIES**
- MSR-50/C0 remote accessory
- TG-701 aerosol test gas
- T-PB power supplies
- WP-2000 weatherproof enclosure
  (All available from Air Products and Controls Inc.)

**POWER REQUIREMENTS**

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<tr>
<th>Input Power</th>
<th>Standby Current</th>
<th>Alarm Current</th>
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<tr>
<td>24VAC</td>
<td>55mA</td>
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<tr>
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RELAY CONTACT RATING:

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<th></th>
<th>Alarm Contacts</th>
<th>Trouble Contacts</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Resistive load: 2 sets form “C” rated at 10 Amps @ 115VAC</td>
<td>Resistive load: 1 set form “C” rated at 10 Amps @ 115VAC</td>
</tr>
<tr>
<td></td>
<td>Resistive load: 1 set form “A” rated at 2 Amps</td>
<td>Resistive load: 1 set form “C” rated at 10 Amps @ 115VAC</td>
</tr>
</tbody>
</table>

AIR VELOCITY 100 to 4,000 ft. /min.

AMBIENT TEMPERATURE 32ºF to 158ºF (0ºC to 70ºC)

HUMIDITY 10% to 85% RH Non-Condensing / Non-Freezing

WIRING Solid or stranded: #12 to #22 AWG terminals
Grey plastic back box, clear plastic cover (Makrolon 94V-0)

MATERIAL Do not expose to corrosive atmospheres.

DIMENSIONS 13 ½” L x 4 ½” W x 2 ¼” D

MAX. NET WT.: 2 ½ lbs.

HARDWARE 7” exhaust tube, FAST Tube starter sampling tube, sampling tube end cap, mounting template, and mounting hardware included.

N. Addressable Dry Contact Monitor Module:
1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to one of the fire alarm control panel SLC loops.
2. The monitor module shall mount in a 4-inch square, 2-1/8 inch deep electrical box.
3. The IDC zone may be wired for Style D or Style B operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.
4. For difficult to reach areas, the monitor module shall be available in a miniature package and shall be no larger than 2-3/4 inch x 1-1/4 inch x 1/2 inch. This version need not include Style D or an LED.

O. Two-Wire Detector Monitor Module:
1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional 2-wire smoke detectors or alarm initiating devices (any N.O. dry contact device).
2. The two-wire monitor module shall mount in a 4-inch square, 2-1/8 inch deep electrical box or with an optional surface backbox.
3. The IDC zone may be wired for Class A or B (Style D or Style B) operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.
P. Addressable Control Module:
1. Addressable control modules shall be provided to supervise and control the operation of one conventional NACs of compatible, 24 VDC powered, polarized audio/visual notification appliances. For fan shutdown and other auxiliary control functions, the control module may be set to operate as a dry contact relay.
2. The control module shall mount in a standard 4-inch square, 2-1/8 inch deep electrical box, or to a surface mounted backbox.
3. The control module NAC may be wired for Style Z or Style Y (Class A/B) with up to 1 amp of inductive A/V signal, or 2 amps of resistive A/V signal operation, or as a dry contact (Form-C) relay. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to insure that 100% of all auxiliary relay or NACs may be energized at the same time on the same pair of wires.
4. Audio/visual power shall be provided by a separate supervised power loop from the main fire alarm control panel or from a supervised, UL listed remote power supply.
5. The control module shall be suitable for pilot duty applications and rated for a minimum of .6 amps at 30 VDC.

Q. Isolator Module:
1. Isolator modules shall be provided to automatically isolate wire-to-wire short circuits on an SLC loop. The isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC Loop. At least one isolator module shall be provided for each floor or protected zone of the building.
2. If a wire-to-wire short occurs, the isolator module shall automatically open-circuit (disconnect) the SLC loop. When the short circuit condition is corrected, the isolator module shall automatically reconnect the isolated section.
3. The isolator module shall not require any address setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset an isolator module after its normal operation.
4. The isolator module shall mount in a standard 4-inch deep electrical box or in a surface mounted backbox. It shall provide a single LED that shall flash to indicate that the isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.

R. LCD Alphanumeric Display Annunciator:
1. The alphanumeric display annunciator shall be a supervised, backlit LCD display containing a minimum of eighty (80) characters for alarm annunciation in clear English text.
2. The LCD annunciator shall display all alarm and trouble conditions from either the network node or complete network, via the INA.
3. Up to 32 LCD annunciators may be connected to a specific (terminal mode) EIA 485 interface. LCD annunciators shall not reduce the annunciation capacity of the system. Each LCD shall include vital system wide functions such as, system acknowledge, silence and reset.

4. LCD display annunciators shall mimic the local control panel 80 character display or network annunciator and shall not require special programming.

S. Batteries and External Charger:
   1. Battery:
      a. Batteries shall be 12 volt, Gell-Cell type.
      b. The battery shall have sufficient capacity to power the fire alarm system for not less than 60 hours plus 10 minutes of alarm upon a normal AC power failure.
      c. The batteries are to be completely maintenance free. No liquids are required. Fluid level checks for refilling, spills and leakage shall not be required.

T. Audio/Visual Unit (Xenon Strobe):
   1. Combination horn strobe units - Provide Truealert Non-Addressable 75 Cd, Red Sync. 2-Wire. Comprised of a 24 VDC Xenon Flash Tube entirely solid state. The unit shall require a sync. Control module. Provide True 75 Cd from all axis.
   2. Combination horn strobe units - Provide Truealert Non-Addressable 110 Cd, Red Sync. 2-Wire. Comprised of a 24 VDC Xenon Flash Tube entirely solid state. The unit shall require a sync. Control module. Provide True 110 Cd from all axis.
   3. Visual only – Provide Truealert Non-Addressable 15 Cd, Red Sync. 2-Wire comprised of a 24 VDC Xenon flash tube entirely solid state.

U. Magnetic Door Holders:
   1. Provide Semi-Flush or Flush Wall Mounted, 24 V.D.C. with catch plate.

V. Provide clear plastic covers with local audible alarm for pull stations in cell block area, where indicated on drawings, or required by fire department.

W. Exterior Strobe-Light:
   1. Provide wall mounted, 24 v.d.c. Strobe, color Red with WRR wall bracket.

X. Digital Dialer:
   1. Provide a UL listed digital communicator with Contact ID, with Point ID and connect to remote central station with two (2) CAT 6 telephone cables in ¾” conduit directly to telephone demarcation. Confirm with local fire department.
Y. Key Box:
1. Proved key depository box equal to Supra Safe 2HSR with tamper switch or as required by Fire Department. Connect tamper switch to security system.

Z. Testing:
1. Manufacturer's Field Services: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and the pretesting, testing, and adjustment of the system.
2. Service personnel shall be qualified and experienced in the inspection, testing, and maintenance of fire alarm systems. Examples of qualified personnel shall be permitted to include, but shall not be limited to, individuals with the following qualifications:
   a. Factory trained and certified.
   b. National Institute for Certification in Engineering Technologies (NICET) fire alarm certified.
   c. International Municipal Signal Association (IMSA) fire alarm certified.
   d. Certified by a state or local authority.
   e. Trained and qualified personnel employed by an organization listed by a national testing laboratory for the servicing of fire alarm systems.
3. Pretesting: Determine, through pretesting, the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new and retest until satisfactory performance and conditions are achieved.
4. Final Test Notice: Provide a 10-day minimum notice in writing when the system is ready for final acceptance testing.
5. Minimum System Tests: Test the system according to the procedures outlined in NFPA 72.
6. Retesting: Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system test that the total system meets the Specifications and complies with applicable standards.
8. Final Test, Certificate of Completion, and Certificate of Occupancy:
   a. Test the entire system new 100% devices as required by the Authority Having Jurisdiction in order to obtain a certificate of occupancy.
   a. Provide a one-year inspection and testing agreement in accordance with local Fire Department requirements and NFPA 72 recommendations. The holder of the testing and maintenance contract shall be a properly licensed and NRTL certified provider of Fire Alarm services and acceptable to the Fire Department.
   b. Fire alarm testing agreement shall provide for a minimum of four inspections per year. Upon completion of each test, list actual devices checked. Provide a report to the Owner.

AA. Training:
   1. Provide two (2) 4 hour sessions of Owner training with Owner’s Representative during two (2) different days.

2.13 SURGE PROTECTION DEVICES

A. SCOPE
   1. This section describes the materials and installation requirements for surge protective devices (SPD) for the protection of all main service and panelboards.

B. SUBMITTALS
   1. Submit shop drawings and product information for approval and final documentation in the quantities listed according to the Conditions of the Contract. All transmittals shall be identified by customer name, customer location, and customer order number.
   2. Submittals shall include UL 1449 3rd Edition Listing documentation verifiable by visiting www.UL.com, clicking “Certifications” link, searching using

UL Category Code: VZCA and VZCA2:
   a. Short Circuit Current Rating (SCCR)
   b. Voltage Protection Ratings (VPRs) for all modes
   c. Maximum Continuous Operating Voltage rating (MCOV)
   d. I-nominal rating (I-n)
   e. SPD shall be UL listed and labeled as Type 1 or Type 4 intended for Type 1 or Type 2 applications

   3. Upon request, an unencapsulated but complete SPD is formally known as TVSS shall be presented for visual inspection.
   4. Minimum of ten (10) year warranty

C. RELATED STANDARDS
   1. IEEE C62.41.1, IEEE Guide on the Surge Environment in Low-Voltage (1000 V and Less) AC Power Circuits,
   2. IEEE C62.41.2, IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits,
5. UL 1283 - Electromagnetic Interference Filters

D. QUALITY ASSURANCE
1. Manufacturer Qualifications: Engage a firm with at least 5 years experience in manufacturing transient voltage surge suppressors.
2. Manufacturer shall be ISO 9001 or 9002 certified.
3. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of ten (10) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
4. The SPD shall be compliant with the Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC.

E. DELIVERY, STORAGE AND HANDLING
1. Handle and store equipment in accordance with manufacturer’s Installation and Maintenance Manuals. One (1) copy of this document to be provided with the equipment at time of shipment.

F. MANUFACTURERS
1. Provide an internally mounted Surge Protective Devices (SPD) formerly called Transient Voltage Suppressor (TVSS) by:
   a. Siemens Industry.
   b. Current Technology
   c. LEA
   d. Liebert
   e. APT

G. ELECTRICAL DISTRIBUTION EQUIPMENT
1. Service Entrance
   a. SPD shall be UL 1449 labeled as Type 1 or Type 4 intended for Type 1 or Type 2 applications, verifiable at UL.com, without need for external or supplemental overcurrent controls. Every suppression component of every mode, including N-G, shall be protected by internal overcurrent and thermal overtemperature controls. SPDs relying upon external or supplementary installed safety disconnectors do not meet the intent of this specification.
   b. SPD shall be factory installed integral to electrical distribution equipment.
c. SPD shall be UL labeled with 20kA I-nominal (I-n).
d. SPD shall be UL labeled with 200kA Short Circuit Current Rating (SCCR).
e. Standard 7 Mode Protection paths: SPD shall provide surge current paths for all modes of protection: L-N, L-G, L-L, and N-G for Wye systems; L-L, L-G in Delta and impedance grounded Wye systems.
f. True 10 Mode Protection paths: SPD shall provide “directly connected protection elements” between all possible modes of protection: L-N, L-G, L-L, and N-G for Wye systems; L-L, L-G in Delta and impedance grounded Wye systems.
g. SPD shall be connected external of the distribution equipment with an appropriately sized 200kA SCCR rated disconnect.
h. SPD shall meet or exceed the following criteria:
   1) Maximum 7-Mode surge current capability shall be [300kA] [400kA] [500kA] per phase.
   2) Maximum 10-Mode surge current capability shall be [300kA] [450kA] per phase.
   3) UL 1449 - Third Edition Revision; effective September 29, 2009 Voltage Protection Ratings shall not exceed the following:

<table>
<thead>
<tr>
<th>VOLTAGE</th>
<th>L-N</th>
<th>L-G</th>
<th>N-G</th>
<th>L-L</th>
<th>MCOV</th>
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<tbody>
<tr>
<td>208Y/120</td>
<td>800V</td>
<td>800V</td>
<td>800V</td>
<td>1200V</td>
<td>150V</td>
</tr>
<tr>
<td>480Y/277</td>
<td>1200V</td>
<td>1200V</td>
<td>1200V</td>
<td>2000V</td>
<td>320V</td>
</tr>
</tbody>
</table>

i. UL 1449 Listed Maximum Continuous Operating Voltage (MCOV) (verifiable at UL.com):

<table>
<thead>
<tr>
<th>System Voltage</th>
<th>Allowable System Voltage Fluctuation (%)</th>
<th>MCOV</th>
</tr>
</thead>
<tbody>
<tr>
<td>208Y/120</td>
<td>25%</td>
<td>150V</td>
</tr>
<tr>
<td>480Y/277</td>
<td>15%</td>
<td>320V</td>
</tr>
</tbody>
</table>

j. SPD shall incorporate a UL 1283 listed EMI/RFI filter with minimum attenuation of -50dB at 100 kHz.
k. Suppression components shall be heavy duty ‘large block’ MOVs, each exceeding 30mm diameter.
l. SPD shall include a serviceable, replaceable module.
m. SPD shall be equipped with the following diagnostics:
   1) Visual LED diagnostics including a minimum of one green LED indicator per phase, and one red service LED.
   2) Audible alarm with on/off silence function and diagnostic test function (excluding branch).
   3) Form C dry contacts
   4) Optional – Surge Counter
5) No other test equipment shall be required for SPD monitoring or testing before or after installation.
n. SPD shall have a response time no greater than 1/2 nanosecond.
o. SPD shall have a 10 year warranty.

2. Distribution Panel
a. SPD shall be UL 1449 labeled as Type 4 intended for Type 1 or Type 2 applications, verifiable at UL.com, without need for external or supplemental overcurrent controls. Every suppression component of every mode, including N-G, shall be protected by internal overcurrent and thermal overtemperature controls. SPDs relying upon external or supplementary installed safety disconnectors do not meet the intent of this specification.
b. SPD shall be factory installed integral to electrical distribution equipment.
c. SPD shall be UL labeled with 20kA I-nominal (I-n)
d. SPD shall be UL labeled with 200kA Short Circuit Current Rating (SCCR).
e. Standard 7 Mode Protection paths: SPD shall provide surge current paths for all modes of protection: L-N, L-G, L-L, and N-G for Wye systems; L-L, L-G in Delta and impedance grounded Wye systems.
f. SPD shall be connected to the buss of the distribution equipment with an appropriately sized 200kA SCCR rated disconnect.
g. SPD shall meet or exceed the following criteria:
   1) Maximum 7-Mode surge current capability shall be 100kA per phase.
   2) Maximum 10-Mode surge current capability shall be 150kA per phase.
   3) UL 1449 - Third Edition Revision; effective September 29, 2009, Voltage Protection Ratings shall not exceed the following:

<table>
<thead>
<tr>
<th>VOLTAGE</th>
<th>L-N</th>
<th>L-G</th>
<th>N-G</th>
<th>L-L</th>
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<td>1200V</td>
<td>1200V</td>
<td>2000V</td>
<td>320V</td>
</tr>
</tbody>
</table>

h. UL 1449 Listed Maximum Continuous Operating Voltage (MCOV) (verifiable at UL.com):
   Allowable System Voltage Fluctuation

<table>
<thead>
<tr>
<th>System Voltage</th>
<th>(%)</th>
<th>MCOV</th>
</tr>
</thead>
<tbody>
<tr>
<td>208Y/120</td>
<td>25%</td>
<td>150V</td>
</tr>
<tr>
<td>480Y/277</td>
<td>15%</td>
<td>320V</td>
</tr>
</tbody>
</table>
i. SPD shall incorporate a UL 1283 listed EMI/RFI filter with minimum attenuation of -50dB at 100 kHz.

j. Suppression components shall be heavy duty ‘large block’ MOVs, each exceeding 30mm diameter.

k. SPD shall include a serviceable, replaceable module.

l. SPD shall be equipped with the following diagnostics:
   1) Visual LED diagnostics including a minimum of one green LED indicator per phase, and one red service LED.
   2) Audible alarm with on/off silence function and diagnostic test function (excluding branch).
   3) Form C dry contacts
   4) Optional – Surge Counter
   5) No other test equipment shall be required for SPD monitoring or testing before or after installation.

m. SPD shall have a response time no greater than 1/2 nanosecond.

n. SPD shall have a 10 year warranty.

3. Branch Panels
   a. The panelboard shall be UL 67 Listed and the SPD shall be UL 1449 labeled as Type 1 or as Type 4 intended for Type 1 or Type 2 applications.
   b. The unit shall be top or bottom feed according to requirements. A circuit directory shall be located inside the door.
   c. SPD shall meet or exceed the following criteria:
      1) Maximum 7-Mode surge current capability shall be 100kA per phase.
      2) Maximum 10-Mode surge current capability shall be 150kA per phase.
      3) UL 1449 - Third Edition Revision; effective September 29, 2009, Voltage Protection Ratings shall not exceed the following:

<table>
<thead>
<tr>
<th>VOLTAGE</th>
<th>L-N</th>
<th>L-G</th>
<th>N-G</th>
<th>L-L</th>
<th>MCOV</th>
</tr>
</thead>
<tbody>
<tr>
<td>208Y/120</td>
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d. UL 1449 Listed Maximum Continuous Operating Voltage (MCOV) (verifiable at UL.com):

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e. SPD shall incorporate a UL 1283 listed EMI/RFI filter with minimum attenuation of -50dB at 100 kHz.

f. Suppression components shall be heavy duty ‘large block’ MOVs, each exceeding 30mm diameter.

g. SPD shall include a serviceable, replaceable module.
h. SPD shall be equipped with the following diagnostics:
   1) Visual LED diagnostics including a minimum of one green LED indicator per phase, and one red service LED.
   2) Audible alarm with on/off silence function and diagnostic test function (excluding branch).
   3) Form C dry contacts
   4) Optional – Surge Counter
   No other test equipment shall be required for SPD monitoring or testing before or after installation.

i. SPD shall have a response time no greater than 1/2 nanosecond.

j. SPD shall have a 10 year warranty.

k. The unit shall have removable interior.

l. The main bus shall be [copper] [aluminum] and rated for the load current required.

m. The unit shall include a 200% rated neutral assembly with copper neutral bus.

n. The unit shall be provided with a safety ground bus.

o. The field connections to the panelboard shall be main lug or main breaker.

p. The unit shall be constructed with flush or surface mounted trim and shall be in a NEMA Type 1 enclosure.

H. INSTALLATION
   1. Install per manufacturer’s recommendations and contract documents.

I. ADJUSTMENTS AND CLEANING
   1. Remove debris from installation site and wipe dust and dirt from all components.
   2. Repaint marred and scratched surfaces with touch up paint to match original finish.

J. TESTING
   1. Check tightness of all accessible mechanical and electrical connections to assure they are torqued to the minimum acceptable manufacture’s recommendations.
   2. Check all installed panels for proper grounding, fastening and alignment.

K. WARRANTY
   1. Equipment manufacturer warrants that all goods supplied are free of non-conformities in workmanship and materials for one year from date of initial operation, but not more than eighteen months from date of shipment.
2.14 DUAL TECHNOLOGY CEILING MOUNT OCCUPANCY SENSORS

A. Dual technology occupancy sensors shall be capable of detecting occupants within the coverage area designated via detection of a doppler shift in the transmitted ultrasonic sound wave and a change in the infrared heat present. Major motion and minor motion shall cause the controlled load to switch to the “ON” mode.

B. Dual technology occupancy sensors shall provide multiple options for initial sensing and confirmation of an occupant so as to conform to environmental factors. Initial detection may be made by either technology or may require both technologies to switch the load to “ON”.

C. The dual technology ultrasonic sensors shall operate at 32.7 kHz and shall be controlled by a quartz crystal oscillator within 0.005%. Ultrasonic sensors shall not cause interference with other sensors when mounted within the same area of coverage.

D. Ultrasonic sensors shall have dedicated transducers for transmission and reception which are temperature and humidity resistant. Ultrasonic receivers shall be temperature and humidity resistant with less than a 6 dB shift in the humidity range of 10% - 90% and less than a 10 dB shift in the temperature range of −20 to 60 C.

E. The dual technology passive infrared sensor shall use a multi-level 100 segment Fresnel lens and four pyroelectric detectors to insure adequate PIR coverage of the intended area.

F. Dual technology sensors shall have on override to “ON” bypass logic key in the event of sensor failure.

G. Sensors are to be ceiling mounted using a back mounting plate and standard electrical outlet boxes.

H. Dual technology sensors shall have 4 LED’s to indicate proper operation and to confirm walk test detection. Ultrasonic detection shall be represented by a set of green LED’s. Passive infrared detection shall be represented by a set of red LED’s.

I. CUI-500-2000-P-EMS sensors shall be designed to operate at 120 VAC or 277 VAC. Sensors shall be rated 2400W @ 120 VAC, 4800W @ 277 VAC and shall have a set of auxiliary contacts.

J. Dual technology sensors shall be designed to eliminate nuisance tripping from RFI and EMI.
K. Dual technology sensors may be wired in parallel with up to 2 sensors per powerpack.

L. Dual technology sensors shall cover up to 2000 sq. ft. for walking motion, with a field of view of 360 degrees.

M. Dual technology sensors shall have a user adjustable sensitivity.

N. Dual technology sensors shall operate on 24 VDC; supplied by #211-1, #212-1 or #213-1 power packs, current draw @ 33mA (EMS version current draw is 50 mA).

O. Dual technology sensors shall be compatible with electronic ballasts, compact fluorescent, and inductive loads.

P. Dual technology sensors shall have a standard 5-year warranty and shall be UL listed.

2.15 SEALS

A. Water Tight Seals
   1. Conduits entering from the exterior or below grade shall have water tight fittings on the outside and on the inside of the conduit.
      a. Fittings on the outside of the conduit shall be O-Z Gedney type FSK or approved equal. Provide type WSK if penetration is within two feet of the high water table. Provide grounding attachment.
      b. Fittings on the inside of the conduit shall be O-Z Gedney type CSBI or approved equal. Provide type CSBG if penetration is within two feet of the high water table. Provide a blank fitting to seal spare or empty conduits.
      c. O-Z Gedney type CSM fitting may be used when sealing within a sleeve or cored hole.

   2. Submit on seals to be used.

B. Environmental Seals
   1. Provide seals on raceways exposed to widely different temperatures, as in refrigerating or cold storage areas. Install seal to prevent circulation of air from warmer to colder sections through the raceway.

C. Hazardous Area Seals
   1. Provide explosion proof seals as required by the Electric Code.
D. Smoke and Fire Stopping Seals
1. Provide a seal around raceways or cables penetrating full height walls (slab to slab), floors or ventilation or air handling ducts so that the spread of fire or products of combustion shall not be substantially increased.
2. Penetrations through fire-resistant-rated walls, partitions, floors or ceilings shall be firestopped using approved methods and NRTL listed products to maintain the fire resistance rating.
3. Fire stopping in sleeves or in areas that may require the addition or modification of installed cables or raceways shall be a soft, pliable, non-hardening fire stop putty. Putty shall be water resistant and intumescent. Provide for all sleeves and raceways.
4. Firestopping in locations not likely to require frequent modification shall be NRTL listed putty, caulk or mortar to meet the required fire resistant rating.
5. Box penetrations into a fire rated wall or shaft shall have a fire stopping pad installed on the back of the box.
6. Firestopping of cable trays or busways through walls shall be within a non-hardening putty or with seal bags.
7. Firestopping materials shall be NRTL listed to UL 1479 (ASTM E814). Installation methods shall conform to a UL firestopping system. Submit specifications and installation drawings for the type of material to be used. Firestopping materials shall be as manufactured by 3M, International Protective Coatings Corp., RayChem or approved equal.

2.16 FIRESTOP SYSTEMS
A. General: Provide firestopping at all fire-rated construction where penetrated by the Work of this Section.
B. Refer to Section 078400 – Firestopping, for all product requirements for maintaining integrity of fire-rated construction at penetrations.

PART 3 - EXECUTION

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

C. Furnish to Construction Manager and other subcontractors information relative to portions of electrical installation that will affect other trades sufficiently in advance so that they may plan their work and installation.

D. Obtain from other trades information relative to electrical work which he, the Electrical Subcontractor, is to execute in conjunction with installation of other trades' equipment.

E. Lighting fixtures in mechanical spaces or utility/storage rooms shall only be installed after all mechanical equipment is in place.

3.2 PLANS AND SPECIFICATIONS

A. Plans:
   1. Drawings showing layout of electrical systems indicate approximate location of raceways, outlets, and apparatus. Runs of feeders and branch circuits are schematic and are not intended to show exact routing. Final determination as to routing shall be governed by structural conditions and as indicated on the approved coordination drawings.

B. Specifications:
   1. Specifications supplement drawings and provide specifics pertaining to methods and material to be used.

3.3 IDENTIFICATION

A. Equipment shall be marked for ease of identification as follows.
   1. Provide screw-on nameplates on switchboards, panelboards, F.A. terminal cabinets, starters, and disconnect switches. Nameplates to be of black phenolic with white engraving. For starters and disconnect switches lettering shall be minimum of 1/4" high. Nameplates on panelboards shall have the following information.
      a. Line 1 - Panel designation in 1/2" high letters.
      b. Line 2 - Utilization voltage in 3/8" high letters.
      c. Line 3 - Distribution source "Fed from " in 1/4" high letters.
2. Neatly typed directory cards listing circuit designations shall be fastened inside the cover of panelboards. Spare circuits shall be penciled.

3. Color coding schedules. If there is more than a single system voltage, different voltages shall have separate color codes, as previously specified. A copy of the color code schedule shall be affixed to each secondary switchboard and distribution panel and shall be of the phenolic nameplate type as previously specified. A typewritten color code schedule shall also be affixed, under plastic, inside each panelboard door.

4. Outlet boxes both concealed and exposed shall be identified as to panel origination and circuit number by means of fibre pen on the inside of coverplate.

5. Special system outlet boxes concealed above hung ceilings shall be identified as to system by spray painting during roughing. The following systems shall be identified.
   a. Fire Alarm - red.
   d. Sound - green.

6. Wiring device plates on devices connected to normal-emergency circuits shall be red in color.

7. All conductors in boxes larger than standard outlet boxes, in all wireways, trench headers, etc. shall be grouped logically and be identified.

8. Grounding conductors and neutrals shall be labeled in panels, wireways, etc. as to circuits associated with.

3.4 PROTECTION AND CLEANUP

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

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

3.5 PORTABLE OR DETACHABLE PARTS

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

3.6 SAFETY PRECAUTIONS

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

3.7 MOUNTING HEIGHTS

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

1. Duplex convenience outlets, microphone outlets, and telephone outlets - 18 inches.
2. Light switches, pushbutton stations, HOA switches, and all other toggle or control switches for the operation of heating, ventilating, and air conditioning, plumbing, and general service - 48 inches.
3. Clock outlets - 84 inches.
5. Fire alarm audio visual signals - 80 inches or 6 inches below ceiling, whichever is lower.
6. Panelboards for lighting, power, telephone, and other auxiliary systems - 78" to top.
7. Equipment located in lobbies shall be located as detailed on architectural drawings or as directed by Architect.
8. All receptacles, light switches, fire alarm signals, and clocks sharing a common location shall be symmetrically arranged.
9. Exterior and interior wall brackets shall be as detailed on architectural drawings or as directed by Architect.

B. Mounting heights given are from finished floor to centerline. In the case of a raised floor, surface of raised floor is the finished floor.
3.8 WORKMANSHIP AND INSTALLATION METHODS

A. Work shall be installed in first-class manner consistent with best current trade practices. Equipment shall be securely installed plumb and/or level. Flush-mounted outlet boxes shall have front edge flush with finished wall surface. No electrical equipment shall be supported by work of other trades. Cable systems shall be supported and not draped over ducts and piping or laid on ceiling suspension members. Lighting fixtures shall be installed to agree with Architects reflected ceiling plans.

B. Supports:
1. Support work in accordance with best industry practice and by use of standard fittings.
2. In general, walls and partitions will not be suitable for supporting weight of panelboards, dry type transformers and the like. Provide supporting frames or racks extending from floor slab to structure above.
3. Provide supporting frames or racks for equipment, intended for vertical surface mounting in free standing position where no walls exist.
4. Supporting frames or racks shall be of standard angle, standard channel or specialty support system steel members, rigidly bolted or welded together and adequately braced to form a substantial structure. Racks shall be of ample size to assure a workmanlike arrangement of equipment.
5. Provide 3/4" thick painted plywood mounting surfaces in all electric and telephone areas and for all equipment on free standing racks. All plywood shall be fire retardant and painted both sides and edges with 2 coats of white paint.
6. No work for exposed installations in damp locations shall be mounted directly on any building surface. In such locations, flat bar members or spacers shall be used to create a minimum of 1/4" air space between building surfaces and work.
7. Nothing (including outlet, pull and junction boxes and fittings) shall depend on electric raceways or cables for support. All outlet, pull, and junction boxes shall be independently supported.
8. Nothing shall rest on, or depend for support on, suspended ceiling or its mounting members.
9. Support surface or pendant mounted lighting fixtures:
   a. From outlet box by means of an interposed metal strap, where weight is less than five pounds.
   b. From outlet box by means of a hickey or other direct threaded connection, where weight is from five to fifty pounds.
   c. Directly from structural slab, deck or framing member, where weight exceeds fifty pounds.
d. Pendant lighting fixtures shall be supported by threaded rods in non-public areas and by manufacturer’s standard tube hangers with swivel aligner and canopy in public areas. Provide non-standard pendant lengths where required to mount fixtures at elevations either called for on drawings or as shown in architectural elevations.

10. Support recessed lighting fixtures directly from structural slabs, decks or framing members, by means of jack chain or aircraft cable, one at each end of fixture at opposite corners.

11. Where support members must of necessity penetrate air ducts, provide airtight sealing provisions which allow for a relative movement between the support members and the duct walls.

12. Provide channel sills or skids for leveling and support of all floor mounted electrical equipment.

13. Where permitted loading is exceeded by direct application of electrical equipment to a slab or deck, provide proper dunnage as required to distribute the weight in a safe manner.

14. Support metallic raceways by either running within steel frame or hung from the building frame. Anything hung from building frame shall be attached with metallic fasteners.

C. Fastenings:
1. Fasten electric work to building structure in accordance with the best industry practice.

2. Where weight applied to attachment points is 100 pounds or less, fasten to building elements of:
   a. Wood -- with wood screws.
   b. Concrete and solid masonry -- with bolts and expansion shields.
   c. Hollow construction -- with toggle bolts.
   d. Solid metal -- with machine screws in tapped holes or with welded studs.

3. Where weight applied to attachment points exceeds 100 pounds, fasten as follows:
   a. At field poured concrete slabs, provide inserts with 18" minimum length slip-through steel rods, set transverse to reinforcing steel.
   b. Where building is steel framed, utilize suitable auxiliary channel or angle iron bridging between structural steel elements to establish fastening points. Bridging members shall be suitably welded or clamped to building steel. Provide threaded rods or bolts to attach to bridging members.

4. Floor mounted equipment shall not be held in place solely by its own dead weight. Provide floor anchor fastenings. Floor mounted equipment over 72 inches in height shall also be braced to nearest wall or overhead structural elements.
5. For items which are shown as being mounted at locations where fastenings to the building construction element above is not possible, provide suitable auxiliary channel or angle iron bridging to building structural elements.

6. Fastenings for metallic raceways using the fastening as support shall be of the metallic type. Fastenings to hold raceways or cables in place may be via tywraps.

D. General Raceway Installation:
1. Install the various types of raceways in permitted locations as previously specified. All raceways shall be run concealed. Consult Architect for instruction for raceways which must be exposed in public spaces.
2. Raceways for normal-emergency or emergency only wiring cannot contain other conductors.
3. Raceways shall be properly aligned, grouped, and supported in accordance with code. Exposed raceways shall be installed at right angles to or parallel with structural members. Concealed raceways may take most direct route between outlets.
4. Raceways run on trapeze hangers shall be secured to the trapeze.
5. Raceways shall be continuous and shall enter and be secured to all boxes in such a manner that each system shall be electrically continuous from service to all outlets. Provide grounding bushings and bonding jumpers where raceways attach to painted enclosures or terminate below equipment.
6. Where raceways enter boxes, cabinets, tap boxes, other than those having threaded hubs, a standard locknut shall be used on the outside and locknut and bushing on the inside.
7. Where raceways terminate below equipment and there is no direct metal to metal continuity, provide grounding bushings on raceways and interconnect with equipment grounding conductor.
8. All empty raceways shall be provided with a pull wire.
9. All raceway sleeves, stub-ups, or stub-outs, where not connected to a box or cabinet, shall be terminated with a bushing.
10. All raceway joints shall be made up tight and no running threads will be permitted.
11. Where raceways are cut, the inside edge shall be reamed smooth to prevent injury to conductors.
12. All vertical raceways passing through floor slabs shall be supported.
13. Raceways shall not be installed in concrete slabs above grade or below waterproofed slabs.
14. Electric raceways and/or sleeves passing through floors or walls shall be of such size and in such location as not to impair strength of construction. Where raceways alter structural strength or the installation is questionable, the structural engineer shall be contacted for approval.
15. Raceways shall not run directly above or below heat producing apparatus such as boilers, nor shall raceways run parallel within 6 inches of heated pipes. Raceways crossing heated pipes shall maintain at least a 1 inch space from them.

16. Raceways shall be installed in such a manner as to prevent collection of trapped condensates, and all runs shall be arranged to drain.

17. Raceways passing between refrigerated and non-refrigerated spaces and those penetrating enclosures with air movement shall be provided with seals.

18. Raceways feeding fire and jockey pumps shall be rigid metal conduit either run below slab or inside 2 hour rated enclosure. Final connections to motors shall be liquidtite flexible conduit.

19. Where two alternate wiring methods interconnect such as EMT to flexible metal conduit, an outlet box shall be provided.

20. All empty raceways entering building and all sleeves or core drilled openings through floors shall be sealed.

21. Each exterior raceway or assembly in a ductbank shall be provided with continuous warning tape installed 12 inches above raceway or ductbank.

22. Underground rigid non-metallic raceways where allowed and run as a ductbank encased in concrete shall be installed with plastic spacers to ensure a separation of 3 inches between raceways. Top of ductbanks shall be 30 inches below grade, unless otherwise detailed.

23. Elbows and extensions of rigid non-metallic raceway systems which penetrate slabs shall be rigid or intermediate metal conduit.

24. Raceways used for transformer connections shall be flexible type and shall contain a grounding conductor.

25. Raceways entering building through foundation wall into a basement area shall be provided with wall entrance seals or with other acceptable waterproofing method.

E. General Outlet Box Installation:
1. Boxes shall be set flush, level & plumb with finish surface and provided with proper type extension rings or plaster covers. Thru the wall boxes are not permitted. Check device or fixture to be mounted to box to ensure box orientation is proper.

2. In addition to boxes shown, install additional boxes where needed to prevent damage to cables and wires during pulling-in operation.

3. Remove knockouts only as required and plug unused openings.

4. Where required for horizontal and vertical alignment of boxes in stud partitions, bar hangers spanning two studs shall be used. Device boxes for insertion type receptacles shall be provided with far side box supports where there are less than two entering nonflexible raceways, and where bar rangers are not provided.
5. Boxes flush mounted in fire rated partitions and on opposite sides of the partition shall be separated by a distance of 24 inches in accordance with UL listing for the box.

6. Locations of outlets indicated on drawings are approximate. For items exposed to view, refer to architectural drawings and coordinate locations with masonry joints, panel joints, ceiling grids, structural members, etc.

7. In case of conflict with standard mounting heights and device alignment, consult Architect prior to roughing.

8. Check all door swings on architectural drawings to ensure lighting switches are installed on strike side of door.

9. The right to make any reasonable change in location of outlets prior to roughing is reserved by Architect. "Reasonable change" shall be interpreted as movement within 10 feet of location shown.

10. Obtain dimensioned plan from Architect for floor outlets.

11. Outlet boxes for use where surface metal raceways are allowed shall be of a type specifically designed to be used with such surface metal raceway systems.

F. Conductor Installation:
1. No conductors shall be pulled into individual raceways until such raceway system is complete and free of debris. No harmful lubricants shall be used to ease pulling.

2. All conductors shall be wired so that grounded conductor is unbroken; switches in all cases being connected in ungrounded conductor.

3. Connections throughout the entire job shall be made with solderless type devices of approved design satisfactory to Inspector of Wires.

4. All taps and splices shall be insulated equal to that of conductor insulation.

5. All conductors of each feeder in pull boxes etc. shall be grouped, tied together, supported, and identified.

6. All conductors in panelboards and other wiring enclosures shall be neatly formed and grouped.

7. All conductors of emergency only and/or normal/emergency shall be run in separate raceway systems to final outlet box.

8. Provide support for conductors in vertical raceways in accordance with Article 300-19.

9. Strip insulation from conductors with approved tools and only of sufficient length for proper termination. Cutting of conductor stranding is unacceptable.

10. Taps from paralleled conductors shall be of a type which tap each conductor, such as ILSICO "PTA" series.

11. Grounding conductors are to be identified as to associated power circuits.
G. Type MC Cable Installation:
1. Where cable is permitted under the products section, the installation of same shall be done in accordance with code and the following:
   a. Cable shall be supported in accordance with code. Tie wire is not an acceptable means of support. Horizontally run cable supports such as Caddy WMX-6, and clamps on vertical runs such as Caddy CJ6 shall be used. Where cables are supported by the structure and only need securing in place, then ty-raps will also be acceptable. Ty-raps are not acceptable as a means of support. All fittings, hangers, and clamps for support and termination of cables shall be of types specifically designed for use with cable, i.e., romex connectors not acceptable.
   b. Armor of cable shall be removed with rotary cutter device equal to roto-split by Seatek Co., not with hacksaw.
   c. Use split "insuliner" sleeves at terminations.
   d. Any cable system used in conjunction with isolated ground circuits shall have both an isolated ground conductor and an equipment ground conductor.

H. Stranded Conductor Installation:
1. If Contractor selects stranded conductors for # 10 AWG and smaller, terminate such conductors as follows:
   a. No stranded conductor may be terminated under a screwhead. Provide insulated terminal lugs for all screw connections equal to Thomas & Betts "STA-KON" type RC with forked tongue and turned up toes. Installation of lugs shall be done with compression tool such as T&B WT-145C which prevents opening of tool until full compression action is completed.
   b. Backwired wiring devices shall be of clamp type; screw tightened. Force fit connections not allowed.
2. Stranded conductors will not be allowed for fire alarm work.

I. Accessibility:
1. Electrical equipment requiring service or manual operation shall be accessible.
2. Work switches for equipment within accessible hung ceiling spaces, such as fan powered terminal boxes, shall be located at terminal box, and so located so as to be accessible.

J. Vibration Elimination:
1. All equipment connections to rotating equipment or equipment capable of vibration shall be made up by flexible raceways.
K. Wiring Device Gaskets:
   1. Provide wiring device gaskets at coverplates where device is mounted in wall separating conditioned and non-conditioned spaces.

3.9 FEEDER CIRCUITS

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

3.10 BRANCH CIRCUITS

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

3.11 FIREPROOFING AND WATERPROOFING

A. Fireproof and waterproof all openings in slabs and walls.
3.12 CUTTING AND PATCHING

A. Openings through new wall surfaces will be provided by General Conditions if Electrical contractor gives suitable notice as erection of surface proceeds. If suitable notice is not given, Electrical contractor shall then be responsible for cost of corrective work required.

B. Patching will be provided by the trade responsible for the surface to be patched.

3.13 MECHANICAL SYSTEM COORDINATION

A. The Mechanical System contractor will be providing various items of mechanical services equipment and control apparatus. In general, Electrical contractor shall connect up power wiring to this equipment.

B. The Mechanical and Electrical contractor shall closely coordinate their respective portions of work.

C. If, due to local regulations, electric heating equipment furnished by the mechanical systems subcontractor is required to be installed by licensed electricians in order to allow connection by Electrical contractor’s licensed electricians, it will then be Mechanical contractor’s responsibility to engage and pay for services of such licensed electricians.

D. Power wiring to be provided by Electrical contractor is the line voltage power supply wiring. Control wiring is responsibility of Mechanical System contractor unless specifically indicated on electrical drawings, or in this Division of the specifications. Temperature Control contractor shall refer to electrical drawings for location of all magnetic starters.

E. 120 volt control wiring source to temperature control panel is the responsibility of Electrical contractor.

3.14 DISTRIBUTION EQUIPMENT TESTING

A. All dry-type transformers, individual motor starters, switchboard and main distribution panels, motor controls, motor control centers, feeder conductors, and emergency systems shall be tested in accordance with the following. In general, all tests shall be done in accordance with the 1995 Acceptance Testing Specifications of the International Electrical Testing Association.

B. The Testing Subcontractor may be an independent contractor or a manufacturer of the equipment, which is to be tested.
C. Test report forms, delineating tests to be made, and method of recording same shall be submitted prior to commencing work. Test reports when submitted shall include interpretation of results and recommendation for any corrective work required.

D. Switchboard and Main Distribution Panels:
   1. Visual Inspection:
      a. Check for foreign material within bus enclosure.
      b. Check for missing hardware.
      c. Inspect entire assemblies for transit damage or factory defects.
      d. Check for all bus dimensions and bracing per specifications.
      e. Check ratings of current transformers and potential transformers.
      f. Check ratings of all protective relays per drawings.

   2. Physical Inspection:
      a. Torque all bus hardware to proper tension.
      b. Circuit breaker interlocks all work properly.
      c. All doors and hinged panels open and close properly.
      d. Relay blocking removed from all control and protective relays.
      e. All circuit breakers operate, close and trip mechanically.
      f. Torque all feeder conductors to terminal manufacturers' recommendations.

   3. Electrical Testing:
      a. Breakers operated electrically trip and close from local and remote positions.
      b. All circuit breakers calibrated to manufacturer's respective time current curves as specified.
         1) Long time pick-up amps.
         2) Long time delay tripping at 300% of current setting.
         3) Resets okay at 80% of pick-up value.
         4) Short time pick-up current.
         5) Short time delay trip time at 105% of setting.
         6) Instantaneous minimum pick-up current.
         7) Ground Fault
      c. All protective relays calibrated to manufacturer's characteristic time curves for pick-up, drop-out, instantaneous and time delay.
      d. All instruments calibrated for accuracy.
      e. Protective relay schemes to be electrically tested by primary injection of current through current transformers and the tripping of associated circuit breakers.
f. Insulation resistance tests made on all circuit breakers, line to load breaker open, line to ground breaker closed, 3 poses tested individually. Switchgear bus to be tested phase to phase and phase to ground with Megohometer type instrument. Relays also to be insulation resistance tested.

E. Transformers:
1. Visual inspection for transit damage such as broken porcelain, brazed connections broken off, core shifted on frame, winding damage, etc.
2. Insulation resistance tests in accordance with U.S.A.S.I. Standard C571222 and NEMA TRI-2.055.
3. D.C. over-potential test procedures and A.C. voltage values for factory proof testing of C57.12968 and NEMA TRI-2.055. The ratio applied for converting A.C. test potential to equivalent D.C. value is 1.6.
4. Acceptance test voltage for new transformers at D.C. value will be 75% of equivalent A.C. voltage used for factor proof testing the value will be 65%.
5. Transformers shall be subjected to a ratio and polarity test to prove the polarity and winding ratio as in accordance with nameplate specifications.
6. Torque all connections to terminal manufacturers’ recommendations.

F. Starters:
1. Visual inspection to determine:
   a. Shipping damage.
   b. Proper bussing and contactor sizes.
   c. Correct overload relay heater ratings. Any incorrectly sized overloads shall be replaced by the contractor who originally provided same.

2. Electrical Testing:
   a. Electrical operation of control relays, timing relay, and contactor coils.
   b. Insulation resistance test on all current carrying bus to ground and between phases.
   c. Calibration check of overload heater to ascertain tripping point and time delay at 300% of heater rating.

G. Conductors: All secondary service conductors and all feeder conductors from switchboards and distribution panels shall be tested.
1. Visual and mechanical inspection: Conductors to be inspected for physical damage and proper connection and sizing in accordance with single line diagram.
2. Conductor connections shall be torque tested to manufacturer's recommended values.
3. **Electrical Tests:** Perform insulation resistance test on each conductor with respect to ground and adjacent conductor. 
4. Perform continuity test to insure proper conductor connection.

3.15 **FAULT CURRENT AND COORDINATION STUDY**

A. Employ the manufacturer of the secondary distribution equipment or an independent organization to perform a fault current and coordination study to ensure a selectively coordinated system from the incoming mains to the branch circuit panelboards.

B. The report shall be submitted in a standard format and shall include the fault current availability at various points in the distribution system, breaker coordination curves and recommended settings of all adjustable devices in the system.

3.16 **STORAGE AND INSTALLATION OF EQUIPMENT**

A. The electrical subcontractor shall store and install electrical equipment and wiring listed for dry locations only after the building is watertight.

**END OF SECTION**