EGREMONT FREE LIBRARY STABILIZATION AND ADA IMPROVEMENTS PROJECT CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS

Prepared for the Town of Egremont
October 6, 2021

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EGREMONT FREE LIBRARY
STABILIZATION AND ACCESSIBILITY IMPROVEMENTS

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EGREMONT FREE LIBRARY
STABILIZATION AND ADA IMPROVEMENTS PROJECT
INVITATION FOR BID

The Town of Egremont, Massachusetts is seeking bids for structural stabilization, interior and exterior ADA improvements and associated plumbing and electrical work, at the Egremont Free Library, listed on the National Register of Historic Places. Bidders and Sub-bidders shall be DCAMM Certified in the General Contractor or Electrical Contractor category. General Contractors will have completed comparable work on at least three National Register properties within the last seven years.

Bidding will consist of Electrical Sub-bid and General Contractor Bid. All Bids shall be submitted to Mary Brazie, Office Administrator, Town of Egremont, (P.O. Box 368) 171 Egremont Plain Road, Egremont, MA 01258, where they will be publicly opened and read. Sealed envelopes shall be clearly marked "Bid for Egremont Free Library Stabilization and ADA Improvements."

Electrical Sub-Bids will be due by 2 PM on Thursday, November 18, 2021.
General Construction Bids will be due by 2 PM on Wednesday, December 1, 2021.

There will be a pre-bid site walk at the project site, 1 Buttonball Lane, South Egremont, on Wednesday, November 3, 2021 at 10 AM. Potential Bidders are strongly encouraged to tour the site at this time. Questions from potential bidders shall be submitted in writing via email to Lyn Smith, Architect at lyn@ecsarchitects.com. Bid documents are posted on the Town website: http://www.egremont-ma.gov .

Each bid shall contain the following:

1. Bid Response Form
2. Contractor/Sub-Bidder Bid Proposal including Alternates and Unit Price Forms
3. OSHA Certification
4. Form of Non-collusion Affidavit
5. Certificate as to Corporate Bidder
6. Certificate as to Payment of State Taxes
7. Bidder's Certification Regarding Prevailing Wage Rates
8. Certificate of Debarment
9. Certificate of Foreign Corporation (if applicable)
10. Bid Bond (5%)
11. Three References for M.G.L. Ch. 149 Construction Contracts
12. DCAMM Certificate in General Contracting

State Law prohibits discrimination. The selection of the contractor shall be made without regard to race, color, sex, age, religion, political affiliation, or national origin. The Town reserves the right to reject any and all bids, to waive any informalities, to advertise for new bids, and to award one or more contracts, wholly or in part, as may be deemed to be in the best interest of the Town. The Board of Selectmen shall be the awarding authority. This is a PREVAILING WAGE Project.

The successful bidder will provide insurance as stated in the Owner-Contractor Agreement. A Payment and Performance Bond in the amount of 100% of the Contract will be required for General and Sub-bids.

If any questions, contact:
Mary Brazie, Selectman and Office Administrator
Town of Egremont - 171 Egremont Plain Road - P.O. Box 368 - Egremont, MA 01258
413-528-0182 phone; 413-528-5465 fax; email: tegremont@egremont-ma.gov

EGREMONT FREE LIBRARY
STABILIZATION AND ADA IMPROVEMENTS PROJECT

INSTRUCTIONS TO BIDDERS

Awarding Authority: Town of Egremont

Title: Egremont Free Library Stabilization and ADA Improvements Project

Base Project Scope:
Stabilization of first floor timber framing and belfry construction. Installation of exterior site accessibility improvements including parking, accessible route and ramp. Renovation of interior toilet rooms for ADA compliance. (Lump sum bid)

Bids shall be submitted to Mary Brazie, Office Administrator, Town of Egremont, 171 Egremont Plain Road, Egremont, MA 01258, and will be publicly opened and read at that time. Sealed envelopes shall be clearly marked "Bid for Egremont Free Library Stabilization and ADA Improvements."

Sub-Bid for Electrical Work is due on Thursday, November 18, 2021
General Bid is due on Wednesday, December 1, 2021

The Prevailing Wage rate requirements for this Contract are located in Attachment A.

Bid forms for this Contract are located in Bid Response section.

The applicable minority workforce utilization percentage is 10%.
The applicable women workforce utilization percentage is 5%.

The time for completion of the Work is specified in Article 6 of the Owner - Contractor Agreement.

Bidding Documents may be obtained at the Office of the Administrator at the above address or on the Town website: http://egremont-ma.gov.

As used herein, capitalized terms shall have the meaning assigned to them in the General Conditions of the Contract and the Owner - Contractor Agreement unless the context clearly indicates otherwise.

ARTICLE 1 - BIDDER'S REPRESENTATION

1.1 Each Bidder by making a bid represents that:
1. The Bidder has read and understands the Contract Documents and the bid is made in accordance therewith.
2. The Bidder has visited the site and is familiar with the local conditions under which the Work has to be performed.

1.2 Failure to so examine the Contract Documents and site will not relieve any Bidder from any obligation under the bid as submitted. Neither the Town nor the Designer will be responsible for errors, omissions and/or charges for extra work arising from Bidder's failure to familiarize him/herself with the Contract Documents or existing conditions.

ARTICLE 2 - REQUESTS FOR INTERPRETATION

2.1 Bidders shall promptly notify the Architect of any ambiguity, inconsistency, or error which they may discover upon examination of the Contract Documents, the site, and local conditions. Such notification must be received by the Architect well before the date bids are due in order to provide sufficient time for the Architect to review the notification and respond before the date bids are due if the Architect deems it appropriate.

2.2 Bidders requiring clarification or interpretation of the Contract Documents shall make such request to the Architect in writing via email to: lyn@ecsarchitects.com in the time frame set forth in 2.1 above.

2.3 It is the sole responsibility of the Bidder to ascertain the existence of any addenda issued by the Awarding Authority/Architect. Addenda will be posted on the Town website: http://www.egremont-ma.gov.

ARTICLE 3 - PREPARATION AND SUBMISSION OF BIDS

3.1 Bids shall be submitted on the "Bid Proposal" form as appropriate.

3.2 All entries on the Bid Form shall be made by computer or in ink.

3.3 Where so indicated on the Bid Form, sums shall be expressed in both words and figures. Where there is a discrepancy between the bid sum expressed in words and the bid sum expressed in figures, the words shall control.

3.4 Each bid must be accompanied by a Bid Deposit. Bid Deposits shall be five (5%) percent of the highest possible bid amount, including all alternates. Bid Deposits shall be made payable to the Town of Egremont and shall be either in the form of cash, certified check, treasurer's or cashier's check issued by a responsible bank or trust company, or a bid bond issued by a surety licensed to do business in the Commonwealth of Massachusetts; and shall be conditioned upon the faithful performance by the principal of the agreements contained in the bid.

Bid deposits of the three (3) lowest responsible and eligible Bidders shall be retained until the execution and delivery of the Owner-Contractor Agreement.

3.5 The bid, including bid deposit, shall be enclosed in a sealed envelope with the following plainly marked on the outside:

BID FOR:

-EGREMONT FREE LIBRARY STABILIZATION AND ADA IMPROVEMENTS PROJECT
-BIDDER'S NAME AND BUSINESS ADDRESS
-PHONE NUMBER & CONTACT PERSON

3.6 Date and time for receipt of bids is set forth on page 1 of these Instructions to Bidders. Any bid not received by the applicable deadline will not be accepted.

3.7 Timely delivery of a bid at the location designated shall be the full responsibility of the Bidders.

ARTICLE 4 – ALTERNATES AND UNIT PRICES

4.1 Alternates are enumerated in the Alternates Form to be submitted with the General Bid .

4.2 Unit Prices are enumerated in the Unit Prices Form to be submitted with the General Bid.

ARTICLE 5 - WITHDRAWAL OF BIDS

5.1 **Before Opening Bids**

5.1.1 Any bid may be withdrawn prior to the specified deadline for the receipt of bids provided that the withdrawal shall be made by a written request signed by a person having the authority to bind the Bidder. The written request must be hand delivered or otherwise delivered to the Awarding Authority's Bid Room addressed to the attention of the Chief Procurement Officer and must be received on or before the date and time appointed as the deadline for the receipt of bids.

5.1.2 Withdrawn bids may be resubmitted up to the time designated for the receipt of bids.

5.2 **After Opening Bids**

A Bidder may withdraw its bid without penalty at any time up to the time of Award as defined below in subsection 8.1 only upon demonstrating to the satisfaction of the Awarding Authority that a death or disability has occurred or a bona fide clerical or mechanical error of a substantial nature was made during the preparation of the bid. Failure to demonstrate conclusively that a bona fide clerical or mechanical error of a substantial nature was made may result in forfeiture of the Bid Deposit.

ARTICLE 6 - CONTRACT AWARD

6.1 Award means the determination and selection of the lowest, responsible and eligible Bidder, by the Awarding Authority.

The Awarding Authority will award the contract to the lowest responsible and eligible Bidder within thirty (30) days, Saturdays, Sundays, and legal holidays excluded after the opening of bids.

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

6.3 The Awarding Authority also reserves the right to reject any bid if it determines that such bid does not represent the bid of a person competent to perform the work as specified or if less than three (3) available bids are received.

6.4 The term "lowest responsible and eligible bidder" shall mean the Bidder (1) whose bid is the lowest of those bidders possessing the skill, ability and integrity necessary for the faithful performance of the work; (2) 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 in the work; (3) who, where the provisions of section eight B of chapter twenty-nine apply, shall have been determined to be qualified thereunder; and (4) who obtains within ten days of the notification of contract award the security by bond required under section twenty-nine of chapter one hundred and forty-nine.

ARTICLE 7 - FORMS REQUIRED AT CONTRACT APPROVAL

7.1 Upon award, the Bidder shall complete the following forms to ensure prompt contract validation. These forms will be provided to the Contractor by the Awarding Authority, and three (3) originals must be submitted.

1 Owner - Contractor Agreement.
2 Form of Corporate Vote (If Applicable)
3 Certificate of Compliance with State Tax Laws
4 Payment and Performance Bonds (See General Conditions)

7.2 Insurance Certificates for the coverage required by Article 7 of the General Conditions must be submitted prior to contract execution by the Awarding Authority.

7.3 The Notice to Proceed with construction shall not be issued until the Owner – Contractor Agreement has been executed.

EGREMONT FREE LIBRARY
STABILIZATION AND ADA IMPROVEMENTS PROJECT

BID RESPONSE FORM

(Bidder)_____

(By)_____

(Title)_____

This bid must bear the written signature of the bidder or that of his duly authorized agent. If the bidder is a corporation or a partnership, the bid must be signed by a duly authorized officer of such corporation, or by a partner and the title of such officer must be stated. Satisfactory completion of the following data is an essential part of submission of this proposal and is required.

Address at which bidder
can be contacted: _____

_____

Telephone number at which
bidder can be contacted: _____

Date: _____
(Seal – if Bid is by a corporation)

Attest:_____

The Town of EGREMONT reserves the right to accept or reject any or all bids if it is in the Town's best interest and to waive any informality in the bids received.

Bidders must submit the following with their bids:

1. Bid Response Form
2. Contractor Bid Proposal
3. OSHA Certification
4. Form of Non-collusion Affidavit
5. Certificate as to Corporate Bidder
6. Certificate as to Payment of State Taxes
7. Bidder's Certification Regarding Prevailing Wage Rates
8. Certificate of Debarment
9. Certificate of Foreign Corporation (if applicable)
10. Bid Bond
11. Three References for M.G.L. Ch. 149 Construction Contracts

(Failure to submit any of the above will cause rejection of the bid proposal)

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STABILIZATION AND ADA IMPROVEMENTS PROJECT

CONTRACTOR
BID PROPOSAL

"The undersigned certifies under penalties of perjury that this bid or proposal 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."

_____
Individual or Corporate Name of Bidder

_____
Signature of Authorized Agent

_____
Printed Name of Authorized Agent

_____
Date

_____
Project Name

_____
Bid Amount ($-----.--) and with words

EGREMONT FREE LIBRARY
STABILIZATION AND ADA IMPROVEMENTS PROJECT

FORM FOR SUB–BID

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 Division No. 16 of the specifications and in any plans specified in such section, prepared by

Evelyn Cole Smith Architects, LLC & Salamone & Associates PC, for Egremont Free Library in

Egremont, Massachusetts,

for the contract sum of _____ dollars ($_____).

For Alternate No. 2, Fire Alarm System; Add $_____

For Alternate No. 3, Lighting Upgrades; Add $_____

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 and 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:

[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 buildings 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 building.

4. Bank reference _____

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.

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)

DOCUMENT 00433 - ALTERNATES FORM

1.1 BID INFORMATION

A. Bidder:_____.

B. Project Name: Egremont Free Library Stabilization and ADA Improvements

C. Project Location: 1 Buttonball Lane, South Egremont, MA

D. Owner: The Town of Egremont

E. Architect: Evelyn Cole Smith Architects, LLC

F. Architect Project Number: 2019027.

1.2 BID FORM SUPPLEMENT

A. This form is required to be attached to the Bid Form.

1.3 DESCRIPTION

A. The undersigned Bidder proposes the amount below be added to or deducted from the Base Bid if particular alternates are accepted by Owner. Amounts listed for each alternate include costs of related coordination, modification, or adjustment.

1. Cost-Plus-Fee Contract: Alternate price given below includes adjustment to Contractor's Fee.

B. If the alternate does not affect the Contract Sum, the Bidder shall indicate "NO CHANGE."

C. If the alternate does not affect the Work of this Contract, the Bidder shall indicate "NOT APPLICABLE."

D. The Bidder shall be responsible for determining from the Contract Documents the effects of each alternate on the Contract Time and the Contract Sum.

E. Owner reserves the right to accept or reject any alternate, in any order, and to award or amend the Contract accordingly within 60 days of the Notice of Award unless otherwise indicated in the Contract Documents.

F. Acceptance or non-acceptance of any alternates by the Owner shall have no effect on the Contract Time unless the "Schedule of Alternates" Article below provides a formatted space for the adjustment of the Contract Time.

1.4 SCHEDULE OF ALTERNATES

A. Alternate No. One: All work included in the removal of the existing carpet and the installation of new carpet.

1. ADD____DEDUCT____NO CHANGE____NOT APPLICABLE____.
_____Dollars ($_____).
2. ADD____DEDUCT____calendar days to adjust the Contract Time for this alternate.

B. Alternate No. Two: All work included in the removal of existing fire alarm system devices and the installation of a new fire alarm system as indicated on the drawings.

1. ADD____DEDUCT____NO CHANGE____NOT APPLICABLE____.
_____Dollars ($_____).
2. ADD____DEDUCT____calendar days to adjust the Contract Time for this alternate.

C. Alternate No. Three: All work included in the removal of existing lighting and the installation of a new lighting where indicated on the drawings.

1. ADD____DEDUCT____NO CHANGE____NOT APPLICABLE____.
_____Dollars ($_____).
2. ADD____DEDUCT____calendar days to adjust the Contract Time for this alternate.

1.5 SUBMISSION OF BID SUPPLEMENT

A. Respectfully submitted this_____day of_____, 2021.

B. Submitted By:_____(Name of bidding firm or corporation).

C. Authorized Signature:_____(Handwritten signature).

D. Signed By:_____(Type or print name).

E. Title:_____(Owner/Partner/President/Vice President).

END OF DOCUMENT 00433

DOCUMENT 00432

UNIT PRICES FORM

1.1 BID INFORMATION

A. Bidder:_____.

B. Project Name: Egremont Free Library Stabilization and ADA Improvements Project.

C. Project Location: 1 Buttonball Lane, South Egremont, MA

D. Owner: The Town of Egremont

E. Architect: Evelyn Cole Smith Architects, LLC

F. Architect Project Number: 2019027.

1.2 BID FORM SUPPLEMENT

A. This form is required to be attached to the Bid Form.

B. The undersigned Bidder proposes the amounts below be added to or deducted from the Contract Sum on performance and measurement of the individual items of Work and for adjustment of the quantity given in the Unit-Price Allowance for the actual measurement of individual items of the Work.

1.3 UNIT PRICES

A. Unit-Price No. 1: Repointing of stone foundation.

_____Dollars ($_____) per SF.

B. Unit-Price No. 2: Replacement of timber sill.

_____Dollars ($_____) per LF.

C. Unit-Price No. 3: Replacement of floor joists.

_____Dollars ($_____) per LF.

1.4 SUBMISSION OF BID SUPPLEMENT

Respectfully submitted this_____day of_____, 2021.

B. Submitted By:_____
(Insert name of bidding firm or corporation).

C. Authorized Signature:_____(Handwritten signature).

D. Signed By:_____(Type or print name).

E. Title:_____(Owner/Partner/President/Vice President).

END OF DOCUMENT
00432

OSHA CERTIFICATION

The undersigned agrees that if he is selected as the contractor, he will comply with the provisions of M.G.L. Chapter 30, Section 39S.

The undersigned certifies, under penalties of perjury, that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in 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 all employees to be employed in the work subject to this bid 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.

Date _____

_____
(Name of General Bidder)

By_____
(Name of person Signing Bid and Title)
Signature is required

_____
(Business Address)

_____
(City and State)

_____
(Telephone Number)

NON-COLLUSION AFFIDAVIT

Commonwealth of Massachusetts_____

County of _____

_____
being first duly sworn, deposes and says,

That he/she is _____, the party making the foregoing bid; that such bid is genuine and not collusive or a sham; that said bidder has not colluded, conspired, connived or agreed directly or indirectly, with any bidder or person, to put in a sham bid or to refrain from bidding, and has not in any manner, directly or indirectly sought by agreement or collusion, or communication or conference, with any person, to fix the bid price of its bid or any other bidder, or to fix any overhead, profit or cost element of said bid price, or of that of any other bidder, or to secure any advantage against the Board of Selectmen, Town of Egremont, Egremont, Massachusetts, 01258 or any person interested in the proposed contract, and that all statements in said bid are true.

Signature of

_____
Bidder, if bidder is an Individual

_____
Partner, if bidder is a Partnership

_____
Officer, if bidder is a Corporation

Subscribed and sworn to before me this _____ day of_____, 2019.

_____
Notary Public

My commission expires _____

CERTIFICATE AS TO CORPORATE BIDDER

I, _____ certify that I am the _____ of the corporation named as bidder in the Bid included herein; that _____, who signed said Bid on behalf of the Bidder was then _____ of said corporation; that I know his/her signature; that his/her signature thereon is genuine and that said Bid was duly signed, sealed and executed for and on behalf of said corporation by authority of its governing body.

(Corporate Seal)

_____
(Secretary – Clerk)

Dated:_____

CERTIFICATE AS TO PAYMENT OF STATE TAXES

Pursuant to M.G.L. Ch. 62C, sec. 49A, I certify under the pains and penalties of perjury that I, to my best knowledge and belief, have filed all state tax returns and paid all state taxes required under law.

_____
Social Security Number or
Federal Identification Number

_____
Signature of Individual
or Corporate Name

By: _____
Corporate Officer
(if applicable)

BIDDER'S CERTIFICATION REGARDING PAYMENT OF PREVAILING WAGES

The undersigned bidder hereby certifies, under the pains and penalties of perjury, that the foregoing bid is based upon the payment to laborers to the employed on the project of wages in an amount no less than the applicable prevailing wage rates established for the project by the Massachusetts Department of Labor and Industries. The undersigned bidder agrees to indemnify the awarding authority for, from and against any loss, expenses, damages, action or claims, including any expense incurred in connection with any delay or stoppage of the project work, arising out of or as a result of (1) the failure of the said bid to be based upon the payment of the said applicable prevailing wage rates, or (2) the failure of the bidder, if selected as the contractor, to pay laborers employed on the project the said applicable prevailing wages.

Dated:_____

Name of Bidder:

_____

By:_____

Name:_____

Title:_____

CERTIFICATE OF DEBARMENT

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 Law or any rule or regulation promulgated hereunder M.G.L. c.149, ss. 44E (2) and 44F(2).

_____
(Company Name)

_____
(Signature/Title)

CERTIFICATE OF FOREIGN CORPORATION

If the Bidder is a foreign corporation, by affixing his/her signature, the Bidder certifies that the corporation is qualified under provision of MGL C181, Section 4 to do business in the Commonwealth of Massachusetts.

_____
Company Name)

_____
(Signature/Title)

If awarded the Contract, the Contractor shall provide with his agreement package, a certificate from the Secretary of the Commonwealth of Massachusetts that the corporation is qualified under provisions of MGL C181, Section 4, to do business in the Commonwealth.

Dated:_____

AWARD OF CONTRACT:

Award will be made to the lowest responsive, responsible and eligible Bidder. The party to whom the contract is awarded will be required to execute the Agreement, obtain Payment Bonds, Insurance Certificates and Certification Form, and a Certificate of Vote of authorization of signature on Documents, within ten (10) calendar days from receipt of Notice of Award. The Notice of Award shall be accompanied by the necessary Agreement and Bid Forms. In case of failure of the Bidder to execute the Agreement and provide the above mentioned Bonds, Certificates, etc., the Town of EGREMONT may at his option, consider the Bidder in default, in which case the bid security accompanying the Bid shall become property of the Town of EGREMONT.

PAYMENT AND PERFORMANCE BONDS:

A Payment and a Performance Bond(s) in the amount of one hundred percent (100%) of the Contract price, with a corporate surety approved by the Town of EGREMONT will be required for the faithful performance of the Contract.

Attorneys-in-fact, who sign Bid Bonds or Payment Bond, must file with each Bond, a certified and effective dated copy of their Power of Attorney.

CONTRACT INSURANCE:

The successful bidder shall provide Commercial General Liability Insurance, Automotive Liability Insurance, Worker's Compensation and Employer's Liability Insurance, including other coverage such as indicated in the General Conditions and as amended in the Supplementary Conditions.

The successful bidder shall provide separate Town of EGREMONT 's Protective Liability Insurance with $1 million liability and $3 million umbrella insurance, with the Town of EGREMONT as insured. A Rider clause to the CONTRACTOR'S Liability Insurance will not be acceptable.

The Certificate of Insurance shall list the Town of EGREMONT as an additional insured.

NOTICE TO PROCEED:

The Notice to Proceed shall be issued within thirty (30) days of the effective date of the Agreement by the Town of EGREMONT. Should there be reasons why the Notice to Proceed cannot be issued within such period; the time may be extended by mutual agreement between the Town of EGREMONT and the successful bidder. If the Notice to Proceed has not been issued within the thirty (30) day period, or within the period mutually agreed upon, the successful bidder may terminate the Agreement without further liability on the part of either party.

ATTACHMENT A

PREVAILING WAGE RATES

The minimum wage rates provided in the following pages have been provided by the Division of Occupational Safety of the Massachusetts Department of Labor and Workforce Development. The Awarding Authority is not responsible for errors or omissions in such wage rates.

M.G.L. c. 149, §. 26 and 27 provide as follows:

". . . Payments by employers to health and welfare plans, pension plans and supplementary unemployment benefit plans under collective bargaining agreements or understandings between organized labor and employers shall be included for the purpose of establishing minimum wage rates as herein provided. . . The aforesaid rates of wages in the schedule of wage rates shall include payments by employers to health and welfare plans, pension plans and supplementary unemployment benefit plans as provided in said section twenty-six, and such payments shall be considered as payments to persons under this section performing work as herein provided. Any employer engaged in the construction of such works who does not make payments to a health and welfare plan, a pension plan and a supplementary unemployment benefit plan, where such payments are included in said rates of wages, shall pay the amount of said payments directly to each employee engaged in said construction".

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

Prevailing Wage Rates

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

CHARLES D. BAKER
Governor

KARYN E. POLITO
Lt. Governor

ROSALIN ACOSTA
Secretary
MICHAEL FLANAGAN
Director

Awarding Authority: Town of Egremont

Contract Number:

City/Town: EGREMONT

Description of Work: Structural stabilization, interior and exterior ADA improvements and associated plumbing and electrical work, at the Egremont Free Library, listed on the National Register of Historic Places.

Job Location: 1 Buttonball Lane, South Egremont MA

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. The wage schedule must be posted in a conspicuous place at the work site for the life of the project in accordance with M.G.L. c. 149 § 27. The wages listed on the wage schedule must be paid to employees performing construction work on the project whether they are employed by the prime contractor, a filed sub-bidder, or 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. An apprentice registered with DAS may be paid the lower apprentice wage rate at the applicable step as provided on the prevailing wage schedule. **Any apprentice not registered with 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.
- Every contractor or subcontractor which performs construction work on the project is required to submit weekly payroll reports and a Statement of Compliance directly to the awarding authority by mail or email and keep them on file for three years. Each weekly payroll report must contain: the employee's name, address, occupational classification, hours worked, and wages paid. Do not submit weekly payroll reports to DLS. A sample of a payroll reporting form may be obtained at http://www.mass.gov/dols/pw.
- Contractors with questions about the wage rates or classifications included on the wage schedule have an affirmative obligation to inquire with DLS at (617) 626-6953.
- 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 criminal penalties.

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2021	$35.95	$13.41	$14.82	$0.00	$64.18
	12/01/2021	$35.95	$13.41	$16.01	$0.00	$65.37
(3 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2021	$36.02	$13.41	$14.82	$0.00	$64.25
	12/01/2021	$36.02	$13.41	$16.01	$0.00	$65.44
(4 & 5 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2021	$36.14	$13.41	$14.82	$0.00	$64.37
	12/01/2021	$36.14	$13.41	$16.01	$0.00	$65.56
ADS/SUBMERSIBLE PILOT *PILE DRIVER LOCAL 56 (ZONE 3)*	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR *LABORERS - ZONE 4 (BUILDING & SITE)*	06/01/2021	$29.10	$8.60	$13.62	$0.00	$51.32
	12/01/2021	$29.91	$8.60	$13.62	$0.00	$52.13
	06/01/2022	$30.73	$8.60	$13.62	$0.00	$52.95
	12/01/2022	$31.54	$8.60	$13.62	$0.00	$53.76
	06/01/2023	$32.36	$8.60	$13.62	$0.00	$54.58
	12/01/2023	$33.17	$8.60	$13.62	$0.00	$55.39
	06/01/2024	$33.99	$8.60	$13.62	$0.00	$56.21
	12/01/2024	$34.80	$8.60	$13.62	$0.00	$57.02
For apprentice rates see "Apprentice- LABORER"						
AIR TRACK OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	06/01/2021	$30.81	$8.60	$14.69	$0.00	$54.10
	12/01/2021	$31.62	$8.60	$14.69	$0.00	$54.91
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
ASBESTOS WORKER (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (SPRINGFIELD)*	12/01/2020	$34.29	$12.80	$8.95	$0.00	$56.04
ASPHALT RAKER *LABORERS - ZONE 4 (BUILDING & SITE)*	06/01/2021	$28.60	$8.60	$13.62	$0.00	$50.82
	12/01/2021	$29.41	$8.60	$13.62	$0.00	$51.63
	06/01/2022	$30.23	$8.60	$13.62	$0.00	$52.45
	12/01/2022	$31.04	$8.60	$13.62	$0.00	$53.26
	06/01/2023	$31.86	$8.60	$13.62	$0.00	$54.08
	12/01/2023	$32.67	$8.60	$13.62	$0.00	$54.89
	06/01/2024	$33.49	$8.60	$13.62	$0.00	$55.71
	12/01/2024	$34.30	$8.60	$13.62	$0.00	$56.52
For apprentice rates see "Apprentice- LABORER"						
ASPHALT RAKER (HEAVY & HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	06/01/2021	$30.31	$8.60	$14.69	$0.00	$53.60
	12/01/2021	$31.12	$8.60	$14.69	$0.00	$54.41
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
AUTOMATIC GRADER-EXCAVATOR (RECLAIMER) *OPERATING ENGINEERS LOCAL 98*	06/01/2021	$37.04	$12.47	$14.50	$0.00	$64.01
	12/01/2021	$37.87	$12.47	$14.50	$0.00	$64.84
	06/01/2022	$38.74	$12.47	$14.50	$0.00	$65.71
	12/01/2022	$39.62	$12.47	$14.50	$0.00	$66.59
	06/01/2023	$40.57	$12.47	$14.50	$0.00	$67.54
	12/01/2023	$41.52	$12.47	$14.50	$0.00	$68.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BACKHOE/FRONT-END LOADER OPERATOR *OPERATING ENGINEERS LOCAL 98*	06/01/2021	$37.04	$12.47	$14.50	$0.00	$64.01
	12/01/2021	$37.87	$12.47	$14.50	$0.00	$64.84
	06/01/2022	$38.74	$12.47	$14.50	$0.00	$65.71
	12/01/2022	$39.62	$12.47	$14.50	$0.00	$66.59
	06/01/2023	$40.57	$12.47	$14.50	$0.00	$67.54
	12/01/2023	$41.52	$12.47	$14.50	$0.00	$68.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER *LABORERS - ZONE 4 (BUILDING & SITE)*	06/01/2021	$28.60	$8.60	$13.62	$0.00	$50.82
	12/01/2021	$29.41	$8.60	$13.62	$0.00	$51.63
	06/01/2022	$30.23	$8.60	$13.62	$0.00	$52.45
	12/01/2022	$31.04	$8.60	$13.62	$0.00	$53.26
	06/01/2023	$31.86	$8.60	$13.62	$0.00	$54.08
	12/01/2023	$32.67	$8.60	$13.62	$0.00	$54.89
	06/01/2024	$33.49	$8.60	$13.62	$0.00	$55.71
	12/01/2024	$34.30	$8.60	$13.62	$0.00	$56.52
For apprentice rates see "Apprentice- LABORER"						
BATCH/CEMENT PLANT - ON SITE *OPERATING ENGINEERS LOCAL 98*	06/01/2021	$36.51	$12.47	$14.50	$0.00	$63.48
	12/01/2021	$37.34	$12.47	$14.50	$0.00	$64.31
	06/01/2022	$38.21	$12.47	$14.50	$0.00	$65.18
	12/01/2022	$39.09	$12.47	$14.50	$0.00	$66.06
	06/01/2023	$40.04	$12.47	$14.50	$0.00	$67.01
	12/01/2023	$40.99	$12.47	$14.50	$0.00	$67.96
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BLOCK PAVER, RAMMER / CURB SETTER *LABORERS - ZONE 4 (BUILDING & SITE)*	06/01/2021	$29.10	$8.60	$13.62	$0.00	$51.32
	12/01/2021	$29.91	$8.60	$13.62	$0.00	$52.13
	06/01/2022	$30.73	$8.60	$13.62	$0.00	$52.95
	12/01/2022	$31.54	$8.60	$13.62	$0.00	$53.76
	06/01/2023	$32.36	$8.60	$13.62	$0.00	$54.58
	12/01/2023	$33.17	$8.60	$13.62	$0.00	$55.39
	06/01/2024	$33.99	$8.60	$13.62	$0.00	$56.21
	12/01/2024	$34.80	$8.60	$13.62	$0.00	$57.02
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	06/01/2021	$30.81	$8.60	$14.69	$0.00	$54.10
	12/01/2021	$31.62	$8.60	$14.69	$0.00	$54.91
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
BOILER MAKER *BOILERMAKERS LOCAL 29*	01/01/2020	$46.10	$7.07	$17.98	$0.00	$71.15

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *BOILERMAKER - Local 29*

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	$29.97	$7.07	$11.69	$0.00	$48.73
2	65	$29.97	$7.07	$11.69	$0.00	$48.73
3	70	$32.27	$7.07	$12.59	$0.00	$51.93
4	75	$34.58	$7.07	$13.49	$0.00	$55.14
5	80	$36.88	$7.07	$14.38	$0.00	$58.33
6	85	$39.19	$7.07	$15.29	$0.00	$61.55
7	90	$41.49	$7.07	$16.18	$0.00	$64.74
8	95	$43.80	$7.07	$17.09	$0.00	$67.96

Notes:

Apprentice to Journeyworker Ratio:1:4

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING)	08/01/2021	$45.56	$11.39	$20.18	$0.00	$77.13
BRICKLAYERS LOCAL 3 (SPRINGFIELD/PITTSFIELD)	02/01/2022	$46.09	$11.39	$20.18	$0.00	$77.66

Apprentice - *BRICK/PLASTER/CEMENT MASON - Local 3 Springfield/Pittsfield*

Effective Date - 08/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.78	$11.39	$20.18	$0.00	$54.35
2	60	$27.34	$11.39	$20.18	$0.00	$58.91
3	70	$31.89	$11.39	$20.18	$0.00	$63.46
4	80	$36.45	$11.39	$20.18	$0.00	$68.02
5	90	$41.00	$11.39	$20.18	$0.00	$72.57

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.05	$11.39	$20.18	$0.00	$54.62
2	60	$27.65	$11.39	$20.18	$0.00	$59.22
3	70	$32.26	$11.39	$20.18	$0.00	$63.83
4	80	$36.87	$11.39	$20.18	$0.00	$68.44
5	90	$41.48	$11.39	$20.18	$0.00	$73.05

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BULLDOZER/POWER SHOVEL/TREE SHREDDER /CLAM SHELL *OPERATING ENGINEERS LOCAL 98*	06/01/2021	$37.04	$12.47	$14.50	$0.00	$64.01
	12/01/2021	$37.87	$12.47	$14.50	$0.00	$64.84
	06/01/2022	$38.74	$12.47	$14.50	$0.00	$65.71
	12/01/2022	$39.62	$12.47	$14.50	$0.00	$66.59
	06/01/2023	$40.57	$12.47	$14.50	$0.00	$67.54
	12/01/2023	$41.52	$12.47	$14.50	$0.00	$68.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
CAISSON & UNDERPINNING BOTTOM MAN *LABORERS - FOUNDATION AND MARINE*	06/01/2021	$41.82	$8.60	$17.72	$0.00	$68.14
	12/01/2021	$42.83	$8.60	$17.72	$0.00	$69.15
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING LABORER *LABORERS - FOUNDATION AND MARINE*	06/01/2021	$40.67	$8.60	$17.72	$0.00	$66.99
	12/01/2021	$41.68	$8.60	$17.72	$0.00	$68.00
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN *LABORERS - FOUNDATION AND MARINE*	06/01/2021	$40.67	$8.60	$17.72	$0.00	$66.99
	12/01/2021	$41.68	$8.60	$17.72	$0.00	$68.00
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR *LABORERS - ZONE 4 (BUILDING & SITE)*	06/01/2021	$28.60	$8.60	$13.62	$0.00	$50.82
	12/01/2021	$29.41	$8.60	$13.62	$0.00	$51.63
	06/01/2022	$30.23	$8.60	$13.62	$0.00	$52.45
	12/01/2022	$31.04	$8.60	$13.62	$0.00	$53.26
	06/01/2023	$31.86	$8.60	$13.62	$0.00	$54.08
	12/01/2023	$32.67	$8.60	$13.62	$0.00	$54.89
	06/01/2024	$33.49	$8.60	$13.62	$0.00	$55.71
	12/01/2024	$34.30	$8.60	$13.62	$0.00	$56.52
For apprentice rates see "Apprentice- LABORER"						
CARPENTER *CARPENTERS LOCAL 336 - BERKSHIRE COUNTY*	09/01/2021	$38.97	$7.16	$18.00	$0.00	$64.13
	03/01/2022	$39.47	$7.16	$18.00	$0.00	$64.63
	09/01/2022	$39.97	$7.16	$18.00	$0.00	$65.13
	03/01/2023	$40.47	$7.16	$18.00	$0.00	$65.63

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *CARPENTER - Local 336 Berkshire*

Effective Date - 09/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.49	$7.16	$1.40	$0.00	$28.05
2	60	$23.38	$7.16	$1.40	$0.00	$31.94
3	70	$27.28	$7.16	$13.80	$0.00	$48.24
4	75	$29.23	$7.16	$13.80	$0.00	$50.19
5	80	$31.18	$7.16	$15.20	$0.00	$53.54
6	80	$31.18	$7.16	$15.20	$0.00	$53.54
7	90	$35.07	$7.16	$16.60	$0.00	$58.83
8	90	$35.07	$7.16	$16.60	$0.00	$58.83

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.74	$7.16	$1.40	$0.00	$28.30
2	60	$23.68	$7.16	$1.40	$0.00	$32.24
3	70	$27.63	$7.16	$13.80	$0.00	$48.59
4	75	$29.60	$7.16	$13.80	$0.00	$50.56
5	80	$31.58	$7.16	$15.20	$0.00	$53.94
6	80	$31.58	$7.16	$15.20	$0.00	$53.94
7	90	$35.52	$7.16	$16.60	$0.00	$59.28
8	90	$35.52	$7.16	$16.60	$0.00	$59.28

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 $26.10/ 3&4 $31.35/ 5&6 $49.64/ 7&8 $54.94

Apprentice to Journeyworker Ratio:1:5

CARPENTER WOOD FRAME *CARPENTERS-ZONE 3 (Wood Frame)*	04/01/2021	$23.16	$7.21	$4.80	$0.00	$35.17
	04/01/2022	$23.66	$7.21	$4.80	$0.00	$35.67
	04/01/2023	$24.16	$7.21	$4.80	$0.00	$36.17

All Aspects of New Wood Frame Work

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *CARPENTER (Wood Frame) - Zone 3*

Effective Date - 04/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$13.90	$7.21	$0.00	$0.00	$21.11
2	60	$13.90	$7.21	$0.00	$0.00	$21.11
3	65	$15.05	$7.21	$0.00	$0.00	$22.26
4	70	$16.21	$7.21	$0.00	$0.00	$23.42
5	75	$17.37	$7.21	$3.80	$0.00	$28.38
6	80	$18.53	$7.21	$3.80	$0.00	$29.54
7	85	$19.69	$7.21	$3.80	$0.00	$30.70
8	90	$20.84	$7.21	$3.80	$0.00	$31.85

Effective Date - 04/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$14.20	$7.21	$0.00	$0.00	$21.41
2	60	$14.20	$7.21	$0.00	$0.00	$21.41
3	65	$15.38	$7.21	$0.00	$0.00	$22.59
4	70	$16.56	$7.21	$0.00	$0.00	$23.77
5	75	$17.75	$7.21	$3.80	$0.00	$28.76
6	80	$18.93	$7.21	$3.80	$0.00	$29.94
7	85	$20.11	$7.21	$3.80	$0.00	$31.12
8	90	$21.29	$7.21	$3.80	$0.00	$32.30

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 $17.63/ 3&4 $19.95/ 5&6 $27.22/ 7&8 $29.54

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING *BRICKLAYERS LOCAL 3 (SPRINGFIELD/PITTSFIELD)*	01/01/2020	$41.94	$12.70	$17.64	$0.62	$72.90

Apprentice - *CEMENT MASONRY/PLASTERING - Springfield/Pittsfield*

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.97	$12.70	$15.41	$0.00	$49.08
2	60	$25.16	$12.70	$17.64	$0.62	$56.12
3	65	$27.26	$12.70	$17.64	$0.62	$58.22
4	70	$29.36	$12.70	$17.64	$0.62	$60.32
5	75	$31.46	$12.70	$17.64	$0.62	$62.42
6	80	$33.55	$12.70	$17.64	$0.62	$64.51
7	90	$37.75	$12.70	$17.64	$0.62	$68.71

Notes:

Steps 3,4 are 500 hrs. All other steps are 1,000 hrs.

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CHAIN SAW OPERATOR *LABORERS - ZONE 4 (BUILDING & SITE)*	06/01/2021	$28.60	$8.60	$13.62	$0.00	$50.82
	12/01/2021	$29.41	$8.60	$13.62	$0.00	$51.63
	06/01/2022	$30.23	$8.60	$13.62	$0.00	$52.45
	12/01/2022	$31.04	$8.60	$13.62	$0.00	$53.26
	06/01/2023	$31.86	$8.60	$13.62	$0.00	$54.08
	12/01/2023	$32.67	$8.60	$13.62	$0.00	$54.89
	06/01/2024	$33.49	$8.60	$13.62	$0.00	$55.71
	12/01/2024	$34.30	$8.60	$13.62	$0.00	$56.52
For apprentice rates see "Apprentice- LABORER"						
COMPRESSOR OPERATOR *OPERATING ENGINEERS LOCAL 98*	06/01/2021	$36.51	$12.47	$14.50	$0.00	$63.48
	12/01/2021	$37.34	$12.47	$14.50	$0.00	$64.31
	06/01/2022	$38.21	$12.47	$14.50	$0.00	$65.18
	12/01/2022	$39.09	$12.47	$14.50	$0.00	$66.06
	06/01/2023	$40.04	$12.47	$14.50	$0.00	$67.01
	12/01/2023	$40.99	$12.47	$14.50	$0.00	$67.96
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
CRANE OPERATOR *OPERATING ENGINEERS LOCAL 98*	06/01/2021	$40.54	$12.47	$14.50	$0.00	$67.51
	12/01/2021	$41.37	$12.47	$14.50	$0.00	$68.34
	06/01/2022	$42.24	$12.47	$14.50	$0.00	$69.21
	12/01/2022	$43.12	$12.47	$14.50	$0.00	$70.09
	06/01/2023	$44.07	$12.47	$14.50	$0.00	$71.04
	12/01/2023	$45.02	$12.47	$14.50	$0.00	$71.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) *PAINTERS LOCAL 35 - ZONE 3*	07/01/2021	$52.86	$8.45	$22.90	$0.00	$84.21
	01/01/2022	$53.66	$8.65	$23.05	$0.00	$85.36
	07/01/2022	$54.86	$8.65	$23.05	$0.00	$86.56
	01/01/2023	$56.06	$8.65	$23.05	$0.00	$87.76
	07/01/2023	$57.26	$8.65	$23.05	$0.00	$88.96
	01/01/2024	$58.46	$8.65	$23.05	$0.00	$90.16
	07/01/2024	$59.66	$8.65	$23.05	$0.00	$91.36
	01/01/2025	$60.86	$8.65	$23.05	$0.00	$92.56

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 07/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.43	$8.45	$0.00	$0.00	$34.88
2	55	$29.07	$8.45	$6.22	$0.00	$43.74
3	60	$31.72	$8.45	$6.78	$0.00	$46.95
4	65	$34.36	$8.45	$7.35	$0.00	$50.16
5	70	$37.00	$8.45	$19.51	$0.00	$64.96
6	75	$39.65	$8.45	$20.08	$0.00	$68.18
7	80	$42.29	$8.45	$20.64	$0.00	$71.38
8	90	$47.57	$8.45	$21.77	$0.00	$77.79

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.83	$8.65	$0.00	$0.00	$35.48
2	55	$29.51	$8.65	$6.27	$0.00	$44.43
3	60	$32.20	$8.65	$6.84	$0.00	$47.69
4	65	$34.88	$8.65	$7.41	$0.00	$50.94
5	70	$37.56	$8.65	$19.63	$0.00	$65.84
6	75	$40.25	$8.65	$20.20	$0.00	$69.10
7	80	$42.93	$8.65	$20.77	$0.00	$72.35
8	90	$48.29	$8.65	$21.91	$0.00	$78.85

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN *LABORERS - ZONE 4 (BUILDING & SITE)*	06/01/2021	$40.82	$8.60	$17.57	$0.00	$66.99
	12/01/2021	$41.83	$8.60	$17.57	$0.00	$68.00
	06/01/2022	$42.83	$8.60	$17.57	$0.00	$69.00
	12/01/2022	$43.83	$8.60	$17.57	$0.00	$70.00
	06/01/2023	$44.83	$8.60	$17.57	$0.00	$71.00
	12/01/2023	$46.08	$8.60	$17.57	$0.00	$72.25

For apprentice rates see "Apprentice- LABORER"

DEMO: BACKHOE/LOADER/HAMMER OPERATOR *LABORERS - ZONE 4 (BUILDING & SITE)*	06/01/2021	$41.82	$8.60	$17.57	$0.00	$67.99
	12/01/2021	$42.83	$8.60	$17.57	$0.00	$69.00
	06/01/2022	$43.83	$8.60	$17.57	$0.00	$70.00
	12/01/2022	$44.83	$8.60	$17.57	$0.00	$71.00
	06/01/2023	$45.83	$8.60	$17.57	$0.00	$72.00
	12/01/2023	$47.08	$8.60	$17.57	$0.00	$73.25

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: BURNERS *LABORERS - ZONE 4 (BUILDING & SITE)*	06/01/2021	$41.57	$8.60	$17.57	$0.00	$67.74
	12/01/2021	$42.58	$8.60	$17.57	$0.00	$68.75
	06/01/2022	$43.58	$8.60	$17.57	$0.00	$69.75
	12/01/2022	$44.58	$8.60	$17.57	$0.00	$70.75
	06/01/2023	$45.58	$8.60	$17.57	$0.00	$71.75
	12/01/2023	$46.83	$8.60	$17.57	$0.00	$73.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: CONCRETE CUTTER/SAWYER *LABORERS - ZONE 4 (BUILDING & SITE)*	06/01/2021	$41.82	$8.60	$17.57	$0.00	$67.99
	12/01/2021	$42.83	$8.60	$17.57	$0.00	$69.00
	06/01/2022	$43.83	$8.60	$17.57	$0.00	$70.00
	12/01/2022	$44.83	$8.60	$17.57	$0.00	$71.00
	06/01/2023	$45.83	$8.60	$17.57	$0.00	$72.00
	12/01/2023	$47.08	$8.60	$17.57	$0.00	$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR *LABORERS - ZONE 4 (BUILDING & SITE)*	06/01/2021	$41.57	$8.60	$17.57	$0.00	$67.74
	12/01/2021	$42.58	$8.60	$17.57	$0.00	$68.75
	06/01/2022	$43.58	$8.60	$17.57	$0.00	$69.75
	12/01/2022	$44.58	$8.60	$17.57	$0.00	$70.75
	06/01/2023	$45.58	$8.60	$17.57	$0.00	$71.75
	12/01/2023	$46.83	$8.60	$17.57	$0.00	$73.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER *LABORERS - ZONE 4 (BUILDING & SITE)*	06/01/2021	$40.82	$8.60	$17.57	$0.00	$66.99
	12/01/2021	$41.83	$8.60	$17.57	$0.00	$68.00
	06/01/2022	$42.83	$8.60	$17.57	$0.00	$69.00
	12/01/2022	$43.83	$8.60	$17.57	$0.00	$70.00
	06/01/2023	$44.83	$8.60	$17.57	$0.00	$71.00
	12/01/2023	$46.08	$8.60	$17.57	$0.00	$72.25
For apprentice rates see "Apprentice- LABORER"						
DIVER *PILE DRIVER LOCAL 56 (ZONE 3)*	08/01/2020	$68.70	$9.40	$23.12	$0.00	$101.22
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER *PILE DRIVER LOCAL 56 (ZONE 3)*	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 3)*	08/01/2020	$73.60	$9.40	$23.12	$0.00	$106.12
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 3)*	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) *DRAWBRIDGE - SEIU LOCAL 888*	07/01/2020	$26.77	$6.67	$3.93	$0.16	$37.53
ELECTRICIAN (Including Core Drilling) *ELECTRICIANS LOCAL 7*	06/27/2021	$45.21	$11.75	$13.26	$0.00	$70.22
	01/02/2022	$45.81	$12.00	$13.42	$0.00	$71.23
	07/03/2022	$46.41	$12.25	$13.69	$0.00	$72.35
	01/01/2023	$47.01	$12.50	$13.96	$0.00	$73.47

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ELECTRICIAN - Local 7*

Effective Date - 06/27/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$18.08	$6.45	$0.54	$0.00	$25.07
2	45	$20.34	$6.45	$0.61	$0.00	$27.40
3	50	$22.61	$11.75	$7.08	$0.00	$41.44
4	55	$24.87	$11.75	$7.15	$0.00	$43.77
5	65	$29.39	$11.75	$8.93	$0.00	$50.07
6	70	$31.65	$11.75	$10.10	$0.00	$53.50

Effective Date - 01/02/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$18.32	$6.60	$0.54	$0.00	$25.46
2	45	$20.61	$6.60	$0.61	$0.00	$27.82
3	50	$22.91	$12.00	$7.13	$0.00	$42.04
4	55	$25.20	$12.00	$7.20	$0.00	$44.40
5	65	$29.78	$12.00	$9.01	$0.00	$50.79
6	70	$32.07	$12.00	$10.20	$0.00	$54.27

Notes:

Steps 1-2 are 1000 hrs; Steps 3-6 are 1500 hrs.

Apprentice to Journeyworker Ratio:2:3**

ELEVATOR CONSTRUCTOR *ELEVATOR CONSTRUCTORS LOCAL 41*	01/01/2021	$56.69	$15.88	$19.31	$0.00	$91.88
	01/01/2022	$58.62	$16.03	$20.21	$0.00	$94.86

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ELEVATOR CONSTRUCTOR - Local 41*

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.35	$15.88	$0.00	$0.00	$44.23
2	55	$31.18	$15.88	$19.31	$0.00	$66.37
3	65	$36.85	$15.88	$19.31	$0.00	$72.04
4	70	$39.68	$15.88	$19.31	$0.00	$74.87
5	80	$45.35	$15.88	$19.31	$0.00	$80.54

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$29.31	$16.03	$0.00	$0.00	$45.34
2	55	$32.24	$16.03	$20.21	$0.00	$68.48
3	65	$38.10	$16.03	$20.21	$0.00	$74.34
4	70	$41.03	$16.03	$20.21	$0.00	$77.27
5	80	$46.90	$16.03	$20.21	$0.00	$83.14

Notes:

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

Apprentice to Journeyworker Ratio:1:1

ELEVATOR CONSTRUCTOR HELPER *ELEVATOR CONSTRUCTORS LOCAL 41*	01/01/2021	$39.68	$15.88	$19.31	$0.00	$74.87
	01/01/2022	$41.03	$16.03	$20.21	$0.00	$77.27
For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"						
FENCE & BEAM RAIL ERECTOR *LABORERS - ZONE 4 (BUILDING & SITE)*	06/01/2021	$28.60	$8.60	$13.62	$0.00	$50.82
	12/01/2021	$29.41	$8.60	$13.62	$0.00	$51.63
	06/01/2022	$30.23	$8.60	$13.62	$0.00	$52.45
	12/01/2022	$31.04	$8.60	$13.62	$0.00	$53.26
	06/01/2023	$31.86	$8.60	$13.62	$0.00	$54.08
	12/01/2023	$32.67	$8.60	$13.62	$0.00	$54.89
	06/01/2024	$33.49	$8.60	$13.62	$0.00	$55.71
	12/01/2024	$34.30	$8.60	$13.62	$0.00	$56.52
For apprentice rates see "Apprentice- LABORER"						
FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	06/01/2021	$30.31	$8.60	$14.69	$0.00	$53.60
	12/01/2021	$31.12	$8.60	$14.69	$0.00	$54.41
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
FIELD ENG.INST/ROD-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 98*	06/01/1999	$18.84	$4.80	$4.10	$0.00	$27.74
FIELD ENG.PARTY CHIEF:BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 98*	06/01/1999	$21.33	$4.80	$4.10	$0.00	$30.23
FIELD ENG.SURVEY CHIEF-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 98*	06/01/1999	$22.33	$4.80	$4.10	$0.00	$31.23
FIRE ALARM INSTALLER *ELECTRICIANS LOCAL 7*	06/27/2021	$45.21	$11.75	$13.26	$0.00	$70.22
	01/02/2022	$45.81	$12.00	$13.42	$0.00	$71.23
	07/03/2022	$46.41	$12.25	$13.69	$0.00	$72.35
	01/01/2023	$47.01	$12.50	$13.96	$0.00	$73.47

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIRE ALARM REPAIR / MAINTENANCE / COMMISSIONING *ELECTRICIANS LOCAL 7*	06/27/2021	$45.21	$11.75	$13.26	$0.00	$70.22
	01/02/2022	$45.81	$12.00	$13.42	$0.00	$71.23
	07/03/2022	$46.41	$12.25	$13.69	$0.00	$72.35
	01/01/2023	$47.01	$12.50	$13.96	$0.00	$73.47
For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"						
FIREMAN *OPERATING ENGINEERS LOCAL 98*	06/01/2021	$36.51	$12.47	$14.50	$0.00	$63.48
	12/01/2021	$37.34	$12.47	$14.50	$0.00	$64.31
	06/01/2022	$38.21	$12.47	$14.50	$0.00	$65.18
	12/01/2022	$39.09	$12.47	$14.50	$0.00	$66.06
	06/01/2023	$40.04	$12.47	$14.50	$0.00	$67.01
	12/01/2023	$40.99	$12.47	$14.50	$0.00	$67.96

Apprentice - *OPERATING ENGINEERS - Local 98 Class 3*

Effective Date - 06/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.91	$12.47	$14.50	$0.00	$48.88
2	70	$25.56	$12.47	$14.50	$0.00	$52.53
3	80	$29.21	$12.47	$14.50	$0.00	$56.18
4	90	$32.86	$12.47	$14.50	$0.00	$59.83

Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$22.40	$12.47	$14.50	$0.00	$49.37
2	70	$26.14	$12.47	$14.50	$0.00	$53.11
3	80	$29.87	$12.47	$14.50	$0.00	$56.84
4	90	$33.61	$12.47	$14.50	$0.00	$60.58

Notes:

Steps 1-2 are 1000 hrs.; Steps 3-4 are 2000 hrs.

Apprentice to Journeyworker Ratio:1:6

FLAGGER & SIGNALER (HEAVY & HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	06/01/2021	$24.50	$8.60	$14.69	$0.00	$47.79
	12/01/2021	$24.50	$8.60	$14.69	$0.00	$47.79
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
FLOORCOVERER *FLOORCOVERERS LOCAL 2168 ZONE III*	09/01/2021	$38.87	$7.16	$18.00	$0.00	$64.03

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *FLOORCOVERER - Local 2168 Zone III*

Effective Date - 09/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.44	$7.16	$1.40	$0.00	$28.00
2	55	$21.38	$7.16	$1.40	$0.00	$29.94
3	60	$23.32	$7.16	$13.80	$0.00	$44.28
4	65	$25.27	$7.16	$13.80	$0.00	$46.23
5	70	$27.21	$7.16	$15.20	$0.00	$49.57
6	75	$29.15	$7.16	$15.20	$0.00	$51.51
7	80	$31.10	$7.16	$16.60	$0.00	$54.86
8	85	$33.04	$7.16	$16.60	$0.00	$56.80

Notes: Steps are 750 hrs.
% After 10/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)
Step 1&2 $26.05/ 3&4 $31.30/ 5&6 $49.57/ 7&8 $54.86

Apprentice to Journeyworker Ratio:1:1

FORK LIFT *OPERATING ENGINEERS LOCAL 98*	06/01/2021	$36.73	$12.47	$14.50	$0.00	$63.70
	12/01/2021	$37.56	$12.47	$14.50	$0.00	$64.53
	06/01/2022	$38.43	$12.47	$14.50	$0.00	$65.40
	12/01/2022	$39.31	$12.47	$14.50	$0.00	$66.28
	06/01/2023	$40.26	$12.47	$14.50	$0.00	$67.23
	12/01/2023	$41.21	$12.47	$14.50	$0.00	$68.18
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GENERATORS/LIGHTING PLANTS *OPERATING ENGINEERS LOCAL 98*	06/01/2021	$33.28	$12.47	$14.50	$0.00	$60.25
	12/01/2021	$34.11	$12.47	$14.50	$0.00	$61.08
	06/01/2022	$34.98	$12.47	$14.50	$0.00	$61.95
	12/01/2022	$35.86	$12.47	$14.50	$0.00	$62.83
	06/01/2023	$36.81	$12.47	$14.50	$0.00	$63.78
	12/01/2023	$37.76	$12.47	$14.50	$0.00	$64.73
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) *GLAZIERS LOCAL 1333*	06/01/2020	$39.18	$10.80	$10.45	$0.00	$60.43

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *GLAZIER - Local 1333*

Effective Date - 06/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.59	$10.80	$1.80	$0.00	$32.19
2	56	$22.04	$10.80	$1.80	$0.00	$34.64
3	63	$24.49	$10.80	$2.45	$0.00	$37.74
4	69	$26.94	$10.80	$2.45	$0.00	$40.19
5	75	$29.39	$10.80	$3.15	$0.00	$43.34
6	81	$31.83	$10.80	$3.15	$0.00	$45.78
7	88	$34.28	$10.80	$10.45	$0.00	$55.53
8	94	$36.73	$10.80	$10.45	$0.00	$57.98

Notes:

Apprentice to Journeyworker Ratio:1:3

GRADER/TRENCHING MACHINE/DERRICK *OPERATING ENGINEERS LOCAL 98*	06/01/2021	$37.04	$12.47	$14.50	$0.00	$64.01
	12/01/2021	$37.87	$12.47	$14.50	$0.00	$64.84
	06/01/2022	$38.74	$12.47	$14.50	$0.00	$65.71
	12/01/2022	$39.62	$12.47	$14.50	$0.00	$66.59
	06/01/2023	$40.57	$12.47	$14.50	$0.00	$67.54
	12/01/2023	$41.52	$12.47	$14.50	$0.00	$68.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
HVAC (DUCTWORK) *SHEETMETAL WORKERS LOCAL 63*	07/01/2021	$38.29	$10.64	$17.33	$1.99	$68.25
	01/01/2022	$39.29	$10.64	$17.33	$2.02	$69.28
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (ELECTRICAL CONTROLS) *ELECTRICIANS LOCAL 7*	06/27/2021	$45.21	$11.75	$13.26	$0.00	$70.22
	01/02/2022	$45.81	$12.00	$13.42	$0.00	$71.23
	07/03/2022	$46.41	$12.25	$13.69	$0.00	$72.35
	01/01/2023	$47.01	$12.50	$13.96	$0.00	$73.47
For apprentice rates see "Apprentice- ELECTRICIAN"						
HVAC (TESTING AND BALANCING - AIR) *SHEETMETAL WORKERS LOCAL 63*	07/01/2021	$38.29	$10.64	$17.33	$1.99	$68.25
	01/01/2022	$39.29	$10.64	$17.33	$2.02	$69.28
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (TESTING AND BALANCING -WATER) *PLUMBERS & PIPEFITTERS LOCAL 104 WESTERN DIVISION*	09/17/2021	$43.46	$9.55	$17.10	$0.00	$70.11
	03/17/2022	$44.71	$9.55	$17.10	$0.00	$71.36
	09/17/2022	$45.71	$9.55	$17.10	$0.00	$72.36
	03/17/2023	$46.96	$9.55	$17.10	$0.00	$73.61
	09/17/2023	$47.96	$9.55	$17.10	$0.00	$74.61
	03/17/2024	$49.21	$9.55	$17.10	$0.00	$75.86
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HVAC MECHANIC *PLUMBERS & PIPEFITTERS LOCAL 104 WESTERN DIVISION*	09/17/2021	$43.46	$9.55	$17.10	$0.00	$70.11
	03/17/2022	$44.71	$9.55	$17.10	$0.00	$71.36
	09/17/2022	$45.71	$9.55	$17.10	$0.00	$72.36
	03/17/2023	$46.96	$9.55	$17.10	$0.00	$73.61
	09/17/2023	$47.96	$9.55	$17.10	$0.00	$74.61
	03/17/2024	$49.21	$9.55	$17.10	$0.00	$75.86
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HYDRAULIC DRILLS (HEAVY & HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	06/01/2021	$30.81	$8.60	$14.69	$0.00	$54.10
	12/01/2021	$31.62	$8.60	$14.69	$0.00	$54.91
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
INSULATOR (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (SPRINGFIELD)*	09/01/2021	$41.60	$13.80	$17.14	$0.00	$72.54
	09/01/2022	$44.05	$13.80	$17.14	$0.00	$74.99

Apprentice - *ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Springfield*

Effective Date - 09/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.80	$13.80	$12.42	$0.00	$47.02
2	60	$24.96	$13.80	$13.36	$0.00	$52.12
3	70	$29.12	$13.80	$14.31	$0.00	$57.23
4	80	$33.28	$13.80	$15.25	$0.00	$62.33

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.03	$13.80	$12.42	$0.00	$48.25
2	60	$26.43	$13.80	$13.36	$0.00	$53.59
3	70	$30.84	$13.80	$14.31	$0.00	$58.95
4	80	$35.24	$13.80	$15.25	$0.00	$64.29

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

IRONWORKER/WELDER *IRONWORKERS LOCAL 12*	07/01/2019	$31.55	$6.75	$19.66	$0.00	$57.96

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *IRONWORKER - Local 12*

Effective Date - 07/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$18.93	$6.75	$3.50	$0.00	$29.18
2	70	$22.09	$6.75	$14.64	$0.00	$43.48
3	80	$25.24	$6.75	$16.22	$0.00	$48.21
4	90	$28.40	$6.75	$17.82	$0.00	$52.97

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

JACKHAMMER & PAVING BREAKER OPERATOR *LABORERS - ZONE 4 (BUILDING & SITE)*	06/01/2021	$28.60	$8.60	$13.62	$0.00	$50.82
	12/01/2021	$29.41	$8.60	$13.62	$0.00	$51.63
	06/01/2022	$30.23	$8.60	$13.62	$0.00	$52.45
	12/01/2022	$31.04	$8.60	$13.62	$0.00	$53.26
	06/01/2023	$31.86	$8.60	$13.62	$0.00	$54.08
	12/01/2023	$32.67	$8.60	$13.62	$0.00	$54.89
	06/01/2024	$33.49	$8.60	$13.62	$0.00	$55.71
	12/01/2024	$34.30	$8.60	$13.62	$0.00	$56.52
For apprentice rates see "Apprentice- LABORER"						
LABORER *LABORERS - ZONE 4 (BUILDING & SITE)*	06/01/2021	$28.35	$8.60	$13.62	$0.00	$50.57
	12/01/2021	$29.16	$8.60	$13.62	$0.00	$51.38
	06/01/2022	$29.98	$8.60	$13.62	$0.00	$52.20
	12/01/2022	$30.79	$8.60	$13.62	$0.00	$53.01
	06/01/2023	$31.61	$8.60	$13.62	$0.00	$53.83
	12/01/2023	$32.42	$8.60	$13.62	$0.00	$54.64
	06/01/2024	$33.24	$8.60	$13.62	$0.00	$55.46
	12/01/2024	$34.05	$8.60	$13.62	$0.00	$56.27

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *LABORER - Zone 4 Building and Site*

Effective Date - 06/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$17.01	$8.60	$13.62	$0.00	$39.23
2	70	$19.85	$8.60	$13.62	$0.00	$42.07
3	80	$22.68	$8.60	$13.62	$0.00	$44.90
4	90	$25.52	$8.60	$13.62	$0.00	$47.74

Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$17.50	$8.60	$13.62	$0.00	$39.72
2	70	$20.41	$8.60	$13.62	$0.00	$42.63
3	80	$23.33	$8.60	$13.62	$0.00	$45.55
4	90	$26.24	$8.60	$13.62	$0.00	$48.46

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER (HEAVY & HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	06/01/2021	$30.06	$8.60	$14.69	$0.00	$53.35
	12/01/2021	$30.87	$8.60	$14.69	$0.00	$54.16

Apprentice - *LABORER (Heavy and Highway) - Zone 4*

Effective Date - 06/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$18.04	$8.60	$14.69	$0.00	$41.33
2	70	$21.04	$8.60	$14.69	$0.00	$44.33
3	80	$24.05	$8.60	$14.69	$0.00	$47.34
4	90	$27.05	$8.60	$14.69	$0.00	$50.34

Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$18.52	$8.60	$14.69	$0.00	$41.81
2	70	$21.61	$8.60	$14.69	$0.00	$44.90
3	80	$24.70	$8.60	$14.69	$0.00	$47.99
4	90	$27.78	$8.60	$14.69	$0.00	$51.07

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: CARPENTER TENDER *LABORERS - ZONE 4 (BUILDING & SITE)*	06/01/2021	$28.35	$8.60	$13.62	$0.00	$50.57
	12/01/2021	$29.16	$8.60	$13.62	$0.00	$51.38
	06/01/2022	$29.98	$8.60	$13.62	$0.00	$52.20
	12/01/2022	$30.79	$8.60	$13.62	$0.00	$53.01
	06/01/2023	$31.61	$8.60	$13.62	$0.00	$53.83
	12/01/2023	$32.42	$8.60	$13.62	$0.00	$54.64
	06/01/2024	$33.24	$8.60	$13.62	$0.00	$55.46
	12/01/2024	$34.05	$8.60	$13.62	$0.00	$56.27
For apprentice rates see "Apprentice- LABORER"						
LABORER: CEMENT FINISHER TENDER *LABORERS - ZONE 4 (BUILDING & SITE)*	06/01/2021	$28.35	$8.60	$13.62	$0.00	$50.57
	12/01/2021	$29.16	$8.60	$13.62	$0.00	$51.38
	06/01/2022	$29.98	$8.60	$13.62	$0.00	$52.20
	12/01/2022	$30.79	$8.60	$13.62	$0.00	$53.01
	06/01/2023	$31.61	$8.60	$13.62	$0.00	$53.83
	12/01/2023	$32.42	$8.60	$13.62	$0.00	$54.64
	06/01/2024	$33.24	$8.60	$13.62	$0.00	$55.46
	12/01/2024	$34.05	$8.60	$13.62	$0.00	$56.27
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER *LABORERS - ZONE 4 (BUILDING & SITE)*	06/01/2021	$28.44	$8.60	$13.91	$0.00	$50.95
	12/01/2021	$29.23	$8.60	$13.91	$0.00	$51.74
	06/01/2022	$30.05	$8.60	$13.91	$0.00	$52.56
	12/01/2022	$30.86	$8.60	$13.91	$0.00	$53.37
	06/01/2023	$31.68	$8.60	$13.91	$0.00	$54.19
	12/01/2023	$32.49	$8.60	$13.91	$0.00	$55.00
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER *LABORERS - ZONE 4 (BUILDING & SITE)*	06/01/2021	$30.35	$8.60	$13.62	$0.00	$52.57
	12/01/2021	$31.16	$8.60	$13.62	$0.00	$53.38
	06/01/2022	$31.98	$8.60	$13.62	$0.00	$54.20
	12/01/2022	$32.79	$8.60	$13.62	$0.00	$55.01
	06/01/2023	$33.61	$8.60	$13.62	$0.00	$55.83
	12/01/2023	$34.42	$8.60	$13.62	$0.00	$56.64
	06/01/2024	$35.24	$8.60	$13.62	$0.00	$57.46
	12/01/2024	$36.05	$8.60	$13.62	$0.00	$58.27
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER (HEAVY & HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	06/01/2021	$30.31	$8.60	$14.69	$0.00	$53.60
	12/01/2021	$31.12	$8.60	$14.69	$0.00	$54.41
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
LABORER: MULTI-TRADE TENDER *LABORERS - ZONE 4 (BUILDING & SITE)*	06/01/2021	$28.35	$8.60	$13.62	$0.00	$50.57
	12/01/2021	$29.16	$8.60	$13.62	$0.00	$51.38
	06/01/2022	$29.98	$8.60	$13.62	$0.00	$52.20
	12/01/2022	$30.79	$8.60	$13.62	$0.00	$53.01
	06/01/2023	$31.61	$8.60	$13.62	$0.00	$53.83
	12/01/2023	$32.42	$8.60	$13.62	$0.00	$54.64
	06/01/2024	$33.24	$8.60	$13.62	$0.00	$55.46
	12/01/2024	$34.05	$8.60	$13.62	$0.00	$56.27
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: TREE REMOVER *LABORERS - ZONE 4 (BUILDING & SITE)*	06/01/2021	$28.35	$8.60	$13.62	$0.00	$50.57
	12/01/2021	$29.16	$8.60	$13.62	$0.00	$51.38
	06/01/2022	$29.98	$8.60	$13.62	$0.00	$52.20
	12/01/2022	$30.79	$8.60	$13.62	$0.00	$53.01
	06/01/2023	$31.61	$8.60	$13.62	$0.00	$53.83
	12/01/2023	$32.42	$8.60	$13.62	$0.00	$54.64
	06/01/2024	$33.24	$8.60	$13.62	$0.00	$55.46
	12/01/2024	$34.05	$8.60	$13.62	$0.00	$56.27
This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR *LABORERS - ZONE 4 (BUILDING & SITE)*	06/01/2021	$28.60	$8.60	$13.62	$0.00	$50.82
	12/01/2021	$29.41	$8.60	$13.62	$0.00	$51.63
	06/01/2022	$30.23	$8.60	$13.62	$0.00	$52.45
	12/01/2022	$31.04	$8.60	$13.62	$0.00	$53.26
	06/01/2023	$31.86	$8.60	$13.62	$0.00	$54.08
	12/01/2023	$32.67	$8.60	$13.62	$0.00	$54.89
	06/01/2024	$33.49	$8.60	$13.62	$0.00	$55.71
	12/01/2024	$34.30	$8.60	$13.62	$0.00	$56.52
For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	06/01/2021	$30.31	$8.60	$14.69	$0.00	$53.60
	12/01/2021	$31.12	$8.60	$14.69	$0.00	$54.41
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
MARBLE & TILE FINISHERS *BRICKLAYERS LOCAL 3 (SPR/PITT) - MARBLE & TILE*	08/01/2021	$37.17	$11.39	$19.48	$0.00	$68.04
	02/01/2022	$37.62	$11.39	$19.48	$0.00	$68.49

Apprentice - *MARBLE-TILE FINISHER-Local 3 Marble/Tile (Spr/Pitt)*

Effective Date - 08/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$18.59	$11.39	$19.48	$0.00	$49.46
2	60	$22.30	$11.39	$19.48	$0.00	$53.17
3	70	$26.02	$11.39	$19.48	$0.00	$56.89
4	80	$29.74	$11.39	$19.48	$0.00	$60.61
5	90	$33.45	$11.39	$19.48	$0.00	$64.32

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$18.81	$11.39	$19.48	$0.00	$49.68
2	60	$22.57	$11.39	$19.48	$0.00	$53.44
3	70	$26.33	$11.39	$19.48	$0.00	$57.20
4	80	$30.10	$11.39	$19.48	$0.00	$60.97
5	90	$33.86	$11.39	$19.48	$0.00	$64.73

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MARBLE MASON/TILE LAYER(SP/PT)SeeBrick *BRICKLAYERS LOCAL 3 (SPR/PITT) - MARBLE & TILE*						
See "BRICK/STONE/ARTIFICIAL MASONRY(INCL.MASONRY WATERPROOFING)						
MECH. SWEEPER OPERATOR (ON CONST. SITES) *OPERATING ENGINEERS LOCAL 98*	06/01/2021	$37.04	$12.47	$14.50	$0.00	$64.01
	12/01/2021	$37.87	$12.47	$14.50	$0.00	$64.84
	06/01/2022	$38.74	$12.47	$14.50	$0.00	$65.71
	12/01/2022	$39.62	$12.47	$14.50	$0.00	$66.59
	06/01/2023	$40.57	$12.47	$14.50	$0.00	$67.54
	12/01/2023	$41.52	$12.47	$14.50	$0.00	$68.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MECHANIC/WELDER/BOOM TRUCK *OPERATING ENGINEERS LOCAL 98*	06/01/2021	$36.51	$12.47	$14.50	$0.00	$63.48
	12/01/2021	$37.34	$12.47	$14.50	$0.00	$64.31
	06/01/2022	$38.21	$12.47	$14.50	$0.00	$65.18
	12/01/2022	$39.09	$12.47	$14.50	$0.00	$66.06
	06/01/2023	$40.04	$12.47	$14.50	$0.00	$67.01
	12/01/2023	$40.99	$12.47	$14.50	$0.00	$67.96
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MILLWRIGHT (Zone 3) *MILLWRIGHTS LOCAL 1121 - Zone 3*	03/01/2021	$37.66	$8.58	$21.57	$0.00	$67.81
	01/03/2022	$38.91	$8.58	$21.57	$0.00	$69.06
	01/02/2023	$40.16	$8.58	$21.57	$0.00	$70.31

Apprentice - *MILLWRIGHT - Local 1121 Zone 3*

Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$20.71	$8.58	$5.72	$0.00	$35.01
2	65	$24.48	$8.58	$17.93	$0.00	$50.99
3	75	$28.25	$8.58	$18.98	$0.00	$55.81
4	85	$32.01	$8.58	$20.01	$0.00	$60.60

Effective Date - 01/03/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$21.40	$8.58	$5.72	$0.00	$35.70
2	65	$25.29	$8.58	$17.93	$0.00	$51.80
3	75	$29.18	$8.58	$18.98	$0.00	$56.74
4	85	$33.07	$8.58	$20.01	$0.00	$61.66

Notes: Step 1&2 Appr. indentured after 1/6/2020 receive no pension,
but do receive annuity. (Step 1 $5.72, Step 2 $6.66)
Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MORTAR MIXER *LABORERS - ZONE 4 (BUILDING & SITE)*	06/01/2021	$28.60	$8.60	$13.62	$0.00	$50.82
	12/01/2021	$29.41	$8.60	$13.62	$0.00	$51.63
	06/01/2022	$30.23	$8.60	$13.62	$0.00	$52.45
	12/01/2022	$31.04	$8.60	$13.62	$0.00	$53.26
	06/01/2023	$31.86	$8.60	$13.62	$0.00	$54.08
	12/01/2023	$32.67	$8.60	$13.62	$0.00	$54.89
	06/01/2024	$33.49	$8.60	$13.62	$0.00	$55.71
	12/01/2024	$34.30	$8.60	$13.62	$0.00	$56.52
For apprentice rates see "Apprentice- LABORER"						
OILER *OPERATING ENGINEERS LOCAL 98*	06/01/2021	$32.20	$12.47	$14.50	$0.00	$59.17
	12/01/2021	$33.03	$12.47	$14.50	$0.00	$60.00
	06/01/2022	$33.90	$12.47	$14.50	$0.00	$60.87
	12/01/2022	$34.78	$12.47	$14.50	$0.00	$61.75
	06/01/2023	$35.73	$12.47	$14.50	$0.00	$62.70
	12/01/2023	$36.68	$12.47	$14.50	$0.00	$63.65
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OTHER POWER DRIVEN EQUIPMENT - CLASS VI *OPERATING ENGINEERS LOCAL 98*	06/01/2021	$30.22	$12.47	$14.50	$0.00	$57.19
	12/01/2021	$31.05	$12.47	$14.50	$0.00	$58.02
	06/01/2022	$31.92	$12.47	$14.50	$0.00	$58.89
	12/01/2022	$32.80	$12.47	$14.50	$0.00	$59.77
	06/01/2023	$33.75	$12.47	$14.50	$0.00	$60.72
	12/01/2023	$34.70	$12.47	$14.50	$0.00	$61.67
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) *PAINTERS LOCAL 35 - ZONE 3*	07/01/2021	$52.86	$8.45	$22.90	$0.00	$84.21
	01/01/2022	$53.66	$8.65	$23.05	$0.00	$85.36
	07/01/2022	$54.86	$8.65	$23.05	$0.00	$86.56
	01/01/2023	$56.06	$8.65	$23.05	$0.00	$87.76
	07/01/2023	$57.26	$8.65	$23.05	$0.00	$88.96
	01/01/2024	$58.46	$8.65	$23.05	$0.00	$90.16
	07/01/2024	$59.66	$8.65	$23.05	$0.00	$91.36
	01/01/2025	$60.86	$8.65	$23.05	$0.00	$92.56

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 07/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.43	$8.45	$0.00	$0.00	$34.88
2	55	$29.07	$8.45	$6.22	$0.00	$43.74
3	60	$31.72	$8.45	$6.78	$0.00	$46.95
4	65	$34.36	$8.45	$7.35	$0.00	$50.16
5	70	$37.00	$8.45	$19.51	$0.00	$64.96
6	75	$39.65	$8.45	$20.08	$0.00	$68.18
7	80	$42.29	$8.45	$20.64	$0.00	$71.38
8	90	$47.57	$8.45	$21.77	$0.00	$77.79

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.83	$8.65	$0.00	$0.00	$35.48
2	55	$29.51	$8.65	$6.27	$0.00	$44.43
3	60	$32.20	$8.65	$6.84	$0.00	$47.69
4	65	$34.88	$8.65	$7.41	$0.00	$50.94
5	70	$37.56	$8.65	$19.63	$0.00	$65.84
6	75	$40.25	$8.65	$20.20	$0.00	$69.10
7	80	$42.93	$8.65	$20.77	$0.00	$72.35
8	90	$48.29	$8.65	$21.91	$0.00	$78.85

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) *	07/01/2021	$36.08	$8.45	$19.00	$0.00	$63.53
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 3*	01/01/2022	$36.78	$8.65	$19.15	$0.00	$64.58
	07/01/2022	$37.83	$8.65	$19.15	$0.00	$65.63
	01/01/2023	$38.93	$8.65	$19.15	$0.00	$66.73
	07/01/2023	$39.98	$8.65	$19.15	$0.00	$67.78
	01/01/2024	$41.08	$8.65	$19.15	$0.00	$68.88
	07/01/2024	$42.13	$8.65	$19.15	$0.00	$69.93
	01/01/2025	$43.23	$8.65	$19.15	$0.00	$71.03

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 3 - Spray/Sandblast - New*

Effective Date - 07/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$18.04	$8.45	$0.00	$0.00	$26.49
2	55	$19.84	$8.45	$4.07	$0.00	$32.36
3	60	$21.65	$8.45	$4.44	$0.00	$34.54
4	65	$23.45	$8.45	$4.81	$0.00	$36.71
5	70	$25.26	$8.45	$16.78	$0.00	$50.49
6	75	$27.06	$8.45	$17.15	$0.00	$52.66
7	80	$28.86	$8.45	$17.52	$0.00	$54.83
8	90	$32.47	$8.45	$18.26	$0.00	$59.18

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$18.39	$8.65	$0.00	$0.00	$27.04
2	55	$20.23	$8.65	$4.13	$0.00	$33.01
3	60	$22.07	$8.65	$4.50	$0.00	$35.22
4	65	$23.91	$8.65	$4.88	$0.00	$37.44
5	70	$25.75	$8.65	$16.90	$0.00	$51.30
6	75	$27.59	$8.65	$17.28	$0.00	$53.52
7	80	$29.42	$8.65	$17.65	$0.00	$55.72
8	90	$33.10	$8.65	$18.40	$0.00	$60.15

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT) *PAINTERS LOCAL 35 - ZONE 3*	07/01/2021	$33.40	$8.45	$19.00	$0.00	$60.85
	01/01/2022	$34.10	$8.65	$19.15	$0.00	$61.90
	07/01/2022	$35.15	$8.65	$19.15	$0.00	$62.95
	01/01/2023	$36.25	$8.65	$19.15	$0.00	$64.05
	07/01/2023	$37.30	$8.65	$19.15	$0.00	$65.10
	01/01/2024	$38.40	$8.65	$19.15	$0.00	$66.20
	07/01/2024	$39.45	$8.65	$19.15	$0.00	$67.25
	01/01/2025	$40.55	$8.65	$19.15	$0.00	$68.35

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 3 - Spray/Sandblast - Repaint*

Effective Date - 07/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$16.70	$8.45	$0.00	$0.00	$25.15
2	55	$18.37	$8.45	$4.07	$0.00	$30.89
3	60	$20.04	$8.45	$4.44	$0.00	$32.93
4	65	$21.71	$8.45	$4.81	$0.00	$34.97
5	70	$23.38	$8.45	$16.78	$0.00	$48.61
6	75	$25.05	$8.45	$17.15	$0.00	$50.65
7	80	$26.72	$8.45	$17.52	$0.00	$52.69
8	90	$30.06	$8.45	$18.26	$0.00	$56.77

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$17.05	$8.65	$0.00	$0.00	$25.70
2	55	$18.76	$8.65	$4.13	$0.00	$31.54
3	60	$20.46	$8.65	$4.50	$0.00	$33.61
4	65	$22.17	$8.65	$4.88	$0.00	$35.70
5	70	$23.87	$8.65	$16.90	$0.00	$49.42
6	75	$25.58	$8.65	$17.28	$0.00	$51.51
7	80	$27.28	$8.65	$17.65	$0.00	$53.58
8	90	$30.69	$8.65	$18.40	$0.00	$57.74

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, NEW) *	07/01/2021	$34.68	$8.45	$19.00	$0.00	$62.13
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 3*	01/01/2022	$35.38	$8.65	$19.15	$0.00	$63.18
	07/01/2022	$36.43	$8.65	$19.15	$0.00	$64.23
	01/01/2023	$37.53	$8.65	$19.15	$0.00	$65.33
	07/01/2023	$38.58	$8.65	$19.15	$0.00	$66.38
	01/01/2024	$39.68	$8.65	$19.15	$0.00	$67.48
	07/01/2024	$40.73	$8.65	$19.15	$0.00	$68.53
	01/01/2025	$41.83	$8.65	$19.15	$0.00	$69.63

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER - Local 35 Zone 3 - BRUSH NEW*

Effective Date - 07/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$17.34	$8.45	$0.00	$0.00	$25.79
2	55	$19.07	$8.45	$4.07	$0.00	$31.59
3	60	$20.81	$8.45	$4.44	$0.00	$33.70
4	65	$22.54	$8.45	$4.81	$0.00	$35.80
5	70	$24.28	$8.45	$16.78	$0.00	$49.51
6	75	$26.01	$8.45	$17.15	$0.00	$51.61
7	80	$27.74	$8.45	$17.52	$0.00	$53.71
8	90	$31.21	$8.45	$18.26	$0.00	$57.92

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$17.69	$8.65	$0.00	$0.00	$26.34
2	55	$19.46	$8.65	$4.13	$0.00	$32.24
3	60	$21.23	$8.65	$4.50	$0.00	$34.38
4	65	$23.00	$8.65	$4.88	$0.00	$36.53
5	70	$24.77	$8.65	$16.90	$0.00	$50.32
6	75	$26.54	$8.65	$17.28	$0.00	$52.47
7	80	$28.30	$8.65	$17.65	$0.00	$54.60
8	90	$31.84	$8.65	$18.40	$0.00	$58.89

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT) *PAINTERS LOCAL 35 - ZONE 3*	07/01/2021	$32.00	$8.45	$19.00	$0.00	$59.45
	01/01/2022	$32.70	$8.65	$19.15	$0.00	$60.50
	07/01/2022	$33.75	$8.65	$19.15	$0.00	$61.55
	01/01/2023	$34.85	$8.65	$19.15	$0.00	$62.65
	07/01/2023	$35.90	$8.65	$19.15	$0.00	$63.70
	01/01/2024	$37.00	$8.65	$19.15	$0.00	$64.80
	07/01/2024	$38.05	$8.65	$19.15	$0.00	$65.85
	01/01/2025	$39.15	$8.65	$19.15	$0.00	$66.95

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 3 - BRUSH REPAINT*

Effective Date - 07/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$16.00	$8.45	$0.00	$0.00	$24.45
2	55	$17.60	$8.45	$4.07	$0.00	$30.12
3	60	$19.20	$8.45	$4.44	$0.00	$32.09
4	65	$20.80	$8.45	$4.81	$0.00	$34.06
5	70	$22.40	$8.45	$16.78	$0.00	$47.63
6	75	$24.00	$8.45	$17.15	$0.00	$49.60
7	80	$25.60	$8.45	$17.52	$0.00	$51.57
8	90	$28.80	$8.45	$18.26	$0.00	$55.51

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$16.35	$8.65	$0.00	$0.00	$25.00
2	55	$17.99	$8.65	$4.13	$0.00	$30.77
3	60	$19.62	$8.65	$4.50	$0.00	$32.77
4	65	$21.26	$8.65	$4.88	$0.00	$34.79
5	70	$22.89	$8.65	$16.90	$0.00	$48.44
6	75	$24.53	$8.65	$17.28	$0.00	$50.46
7	80	$26.16	$8.65	$17.65	$0.00	$52.46
8	90	$29.43	$8.65	$18.40	$0.00	$56.48

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	06/01/2021	$30.06	$8.60	$14.69	$0.00	$53.35
	12/01/2021	$30.87	$8.60	$14.69	$0.00	$54.16
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
PANEL & PICKUP TRUCKS DRIVER *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2021	$35.78	$13.41	$14.82	$0.00	$64.01
	12/01/2021	$35.78	$13.41	$16.01	$0.00	$65.20
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) *PILE DRIVER LOCAL 56 (ZONE 3)*	08/01/2020	$43.53	$9.40	$23.12	$0.00	$76.05
For apprentice rates see "Apprentice- PILE DRIVER"						
PILE DRIVER *PILE DRIVER LOCAL 56 (ZONE 3)*	08/01/2020	$43.53	$9.40	$23.12	$0.00	$76.05

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PILE DRIVER - Local 56 Zone 3*

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	0	$0.00	$0.00	$0.00	$0.00	$0.00

Notes: Apprentice wages shall be no less than the following Steps;
(Same as set in Zone 1)
1$57.06/2$61.96/3$66.87/4$69.32/5$71.78/6$71.78/7$76.68/8$76.68

Apprentice to Journeyworker Ratio:1:5

PIPELAYER *LABORERS - ZONE 4 (BUILDING & SITE)*	06/01/2021	$28.60	$8.60	$13.62	$0.00	$50.82
	12/01/2021	$29.41	$8.60	$13.62	$0.00	$51.63
	06/01/2022	$30.23	$8.60	$13.62	$0.00	$52.45
	12/01/2022	$31.04	$8.60	$13.62	$0.00	$53.26
	06/01/2023	$31.86	$8.60	$13.62	$0.00	$54.08
	12/01/2023	$32.67	$8.60	$13.62	$0.00	$54.89
	06/01/2024	$33.49	$8.60	$13.62	$0.00	$55.71
	12/01/2024	$34.30	$8.60	$13.62	$0.00	$56.52
For apprentice rates see "Apprentice- LABORER"						
PIPELAYER (HEAVY & HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	06/01/2021	$30.31	$8.60	$14.69	$0.00	$53.60
	12/01/2021	$31.12	$8.60	$14.69	$0.00	$54.41
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
PLUMBER & PIPEFITTER *PLUMBERS & PIPEFITTERS LOCAL 104 WESTERN DIVISION*	09/17/2021	$43.46	$9.55	$17.10	$0.00	$70.11
	03/17/2022	$44.71	$9.55	$17.10	$0.00	$71.36
	09/17/2022	$45.71	$9.55	$17.10	$0.00	$72.36
	03/17/2023	$46.96	$9.55	$17.10	$0.00	$73.61
	09/17/2023	$47.96	$9.55	$17.10	$0.00	$74.61
	03/17/2024	$49.21	$9.55	$17.10	$0.00	$75.86

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PLUMBER/PIPEFITTER - Local 104 Western*

Effective Date - 09/17/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$19.56	$9.55	$10.10	$0.00	$39.21
2	50	$21.73	$9.55	$10.10	$0.00	$41.38
3	55	$23.90	$9.55	$10.10	$0.00	$43.55
4	60	$26.08	$9.55	$10.10	$0.00	$45.73
5	65	$28.25	$9.55	$10.10	$0.00	$47.90
6	70	$30.42	$9.55	$10.10	$0.00	$50.07
7	75	$32.60	$9.55	$10.10	$0.00	$52.25
8	80	$34.77	$9.55	$10.10	$0.00	$54.42
9	80	$34.77	$9.55	$17.10	$0.00	$61.42
10	80	$34.77	$9.55	$17.10	$0.00	$61.42

Effective Date - 03/17/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$20.12	$9.55	$10.10	$0.00	$39.77
2	50	$22.36	$9.55	$10.10	$0.00	$42.01
3	55	$24.59	$9.55	$10.10	$0.00	$44.24
4	60	$26.83	$9.55	$10.10	$0.00	$46.48
5	65	$29.06	$9.55	$10.10	$0.00	$48.71
6	70	$31.30	$9.55	$10.10	$0.00	$50.95
7	75	$33.53	$9.55	$10.10	$0.00	$53.18
8	80	$35.77	$9.55	$10.10	$0.00	$55.42
9	80	$35.77	$9.55	$17.10	$0.00	$62.42
10	80	$35.77	$9.55	$17.10	$0.00	$62.42

Notes: **1:1,2:5,3:9,4:12

Apprentice to Journeyworker Ratio:**

PNEUMATIC CONTROLS (TEMP.) *PLUMBERS & PIPEFITTERS LOCAL 104 WESTERN DIVISION*	09/17/2021	$43.46	$9.55	$17.10	$0.00	$70.11
	03/17/2022	$44.71	$9.55	$17.10	$0.00	$71.36
	09/17/2022	$45.71	$9.55	$17.10	$0.00	$72.36
	03/17/2023	$46.96	$9.55	$17.10	$0.00	$73.61
	09/17/2023	$47.96	$9.55	$17.10	$0.00	$74.61
	03/17/2024	$49.21	$9.55	$17.10	$0.00	$75.86
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	06/01/2021	$30.31	$8.60	$14.69	$0.00	$53.60
	12/01/2021	$31.12	$8.60	$14.69	$0.00	$54.41
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
POWDERMAN & BLASTER *LABORERS - ZONE 4 (BUILDING & SITE)*	06/01/2021	$29.35	$8.60	$13.62	$0.00	$51.57
	12/01/2021	$30.16	$8.60	$13.62	$0.00	$52.38
	06/01/2022	$30.98	$8.60	$13.62	$0.00	$53.20
	12/01/2022	$31.79	$8.60	$13.62	$0.00	$54.01
	06/01/2023	$32.61	$8.60	$13.62	$0.00	$54.83
	12/01/2023	$33.42	$8.60	$13.62	$0.00	$55.64
	06/01/2024	$34.24	$8.60	$13.62	$0.00	$56.46
	12/01/2024	$35.05	$8.60	$13.62	$0.00	$57.27
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER (HEAVY & HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	06/01/2021	$31.06	$8.60	$14.69	$0.00	$54.35
	12/01/2021	$31.87	$8.60	$14.69	$0.00	$55.16
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
PUMP OPERATOR (CONCRETE) *OPERATING ENGINEERS LOCAL 98*	06/01/2021	$37.04	$12.47	$14.50	$0.00	$64.01
	12/01/2021	$37.87	$12.47	$14.50	$0.00	$64.84
	06/01/2022	$38.74	$12.47	$14.50	$0.00	$65.71
	12/01/2022	$39.62	$12.47	$14.50	$0.00	$66.59
	06/01/2023	$40.57	$12.47	$14.50	$0.00	$67.54
	12/01/2023	$41.52	$12.47	$14.50	$0.00	$68.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) *OPERATING ENGINEERS LOCAL 98*	06/01/2021	$36.51	$12.47	$14.50	$0.00	$63.48
	12/01/2021	$37.34	$12.47	$14.50	$0.00	$64.31
	06/01/2022	$38.21	$12.47	$14.50	$0.00	$65.18
	12/01/2022	$39.09	$12.47	$14.50	$0.00	$66.06
	06/01/2023	$40.04	$12.47	$14.50	$0.00	$67.01
	12/01/2023	$40.99	$12.47	$14.50	$0.00	$67.96
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER *TEAMSTERS 404 - Construction Service (Northampton)*	05/01/2020	$22.44	$11.07	$6.50	$0.00	$40.01
RIDE-ON MOTORIZED BUGGY OPERATOR *LABORERS - ZONE 4 (BUILDING & SITE)*	06/01/2021	$28.60	$8.60	$13.62	$0.00	$50.82
	12/01/2021	$29.41	$8.60	$13.62	$0.00	$51.63
	06/01/2022	$30.23	$8.60	$13.62	$0.00	$52.45
	12/01/2022	$31.04	$8.60	$13.62	$0.00	$53.26
	06/01/2023	$31.86	$8.60	$13.62	$0.00	$54.08
	12/01/2023	$32.67	$8.60	$13.62	$0.00	$54.89
	06/01/2024	$33.49	$8.60	$13.62	$0.00	$55.71
	12/01/2024	$34.30	$8.60	$13.62	$0.00	$56.52
For apprentice rates see "Apprentice- LABORER"						
ROLLER OPERATOR *OPERATING ENGINEERS LOCAL 98*	06/01/2021	$35.90	$12.47	$14.50	$0.00	$62.87
	12/01/2021	$36.73	$12.47	$14.50	$0.00	$63.70
	06/01/2022	$37.60	$12.47	$14.50	$0.00	$64.57
	12/01/2022	$38.48	$12.47	$14.50	$0.00	$65.45
	06/01/2023	$39.43	$12.47	$14.50	$0.00	$66.40
	12/01/2023	$40.38	$12.47	$14.50	$0.00	$67.35
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Coal tar pitch) *ROOFERS LOCAL 248*	07/16/2021	$34.66	$12.28	$16.73	$0.00	$63.67
For apprentice rates see "Apprentice- ROOFER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg) *ROOFERS LOCAL 248*	07/16/2021	$34.16	$12.28	$16.23	$0.00	$62.67

Apprentice - *ROOFER - Local 248*

Effective Date - 07/16/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$20.50	$12.28	$0.00	$0.00	$32.78
2	65	$22.20	$12.28	$16.23	$0.00	$50.71
3	70	$23.91	$12.28	$16.23	$0.00	$52.42
4	75	$25.62	$12.28	$16.23	$0.00	$54.13
5	80	$27.33	$12.28	$16.23	$0.00	$55.84
6	85	$29.04	$12.28	$16.23	$0.00	$57.55
7	90	$30.74	$12.28	$16.23	$0.00	$59.25
8	95	$32.45	$12.28	$16.23	$0.00	$60.96

Notes:

Steps are 750 hrs.Roofer(Tear Off)1:1; Same as above

Apprentice to Journeyworker Ratio:1:3

ROOFER SLATE / TILE / PRECAST CONCRETE *ROOFERS LOCAL 248*	07/16/2021	$34.66	$12.28	$16.73	$0.00	$63.67
For apprentice rates see "Apprentice- ROOFER"						
SCRAPER *OPERATING ENGINEERS LOCAL 98*	06/01/2021	$36.51	$12.47	$14.50	$0.00	$63.48
	12/01/2021	$37.34	$12.47	$14.50	$0.00	$64.31
	06/01/2022	$38.21	$12.47	$14.50	$0.00	$65.18
	12/01/2022	$39.09	$12.47	$14.50	$0.00	$66.06
	06/01/2023	$40.04	$12.47	$14.50	$0.00	$67.01
	12/01/2023	$40.99	$12.47	$14.50	$0.00	$67.96
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
SELF-POWERED ROLLERS AND COMPACTORS (TAMPERS) *OPERATING ENGINEERS LOCAL 98*	06/01/2021	$35.90	$12.47	$14.50	$0.00	$62.87
	12/01/2021	$36.73	$12.47	$14.50	$0.00	$63.70
	06/01/2022	$37.60	$12.47	$14.50	$0.00	$64.57
	12/01/2022	$38.48	$12.47	$14.50	$0.00	$65.45
	06/01/2023	$39.43	$12.47	$14.50	$0.00	$66.40
	12/01/2023	$40.38	$12.47	$14.50	$0.00	$67.35
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
SELF-PROPELLED POWER BROOM *OPERATING ENGINEERS LOCAL 98*	06/01/2021	$33.28	$12.47	$14.50	$0.00	$60.25
	12/01/2021	$34.11	$12.47	$14.50	$0.00	$61.08
	06/01/2022	$34.98	$12.47	$14.50	$0.00	$61.95
	12/01/2022	$35.86	$12.47	$14.50	$0.00	$62.83
	06/01/2023	$36.81	$12.47	$14.50	$0.00	$63.78
	12/01/2023	$37.76	$12.47	$14.50	$0.00	$64.73
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
SHEETMETAL WORKER *SHEETMETAL WORKERS LOCAL 63*	07/01/2021	$38.29	$10.64	$17.33	$1.99	$68.25
	01/01/2022	$39.29	$10.64	$17.33	$2.02	$69.28

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *SHEET METAL WORKER - Local 63*

Effective Date - 07/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$17.23	$4.79	$4.67	$0.80	$27.49
2	50	$19.15	$5.32	$5.19	$0.89	$30.55
3	55	$21.06	$5.85	$9.33	$1.09	$37.33
4	60	$22.97	$6.38	$9.33	$1.16	$39.84
5	65	$24.89	$6.92	$9.33	$1.23	$42.37
6	70	$26.80	$7.45	$9.33	$1.31	$44.89
7	75	$28.72	$7.98	$9.33	$1.38	$47.41
8	80	$30.63	$8.51	$16.29	$1.66	$57.09
9	85	$32.55	$9.04	$16.29	$1.74	$59.62
10	90	$34.46	$9.58	$16.29	$1.81	$62.14

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$17.68	$4.79	$4.67	$0.81	$27.95
2	50	$19.65	$5.32	$5.19	$0.90	$31.06
3	55	$21.61	$5.85	$9.33	$1.10	$37.89
4	60	$23.57	$6.38	$9.33	$1.18	$40.46
5	65	$25.54	$6.92	$9.33	$1.25	$43.04
6	70	$27.50	$7.45	$9.33	$1.33	$45.61
7	75	$29.47	$7.98	$9.33	$1.40	$48.18
8	80	$31.43	$8.51	$16.29	$1.69	$57.92
9	85	$33.40	$9.04	$16.29	$1.76	$60.49
10	90	$35.36	$9.58	$16.29	$1.84	$63.07

Notes:

Apprentice to Journeyworker Ratio:1:3

SPECIALIZED EARTH MOVING EQUIP < 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2021	$36.24	$13.41	$14.82	$0.00	$64.47
	12/01/2021	$36.24	$13.41	$16.01	$0.00	$65.66
SPECIALIZED EARTH MOVING EQUIP > 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2021	$36.53	$13.41	$14.82	$0.00	$64.76
	12/01/2021	$36.53	$13.41	$16.01	$0.00	$65.95
SPRINKLER FITTER *SPRINKLER FITTERS LOCAL 669*	04/01/2021	$43.14	$10.55	$16.41	$0.00	$70.10

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *SPRINKLER FITTER - Local 669*

Effective Date - 04/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$19.41	$7.75	$0.00	$0.00	$27.16
2	50	$21.57	$7.75	$0.00	$0.00	$29.32
3	55	$23.73	$10.55	$8.15	$0.00	$42.43
4	60	$25.88	$10.55	$8.15	$0.00	$44.58
5	65	$28.04	$10.55	$8.40	$0.00	$46.99
6	70	$30.20	$10.55	$8.40	$0.00	$49.15
7	75	$32.36	$10.55	$8.40	$0.00	$51.31
8	80	$34.51	$10.55	$8.40	$0.00	$53.46
9	85	$36.67	$10.55	$8.40	$0.00	$55.62
10	90	$38.83	$10.55	$8.40	$0.00	$57.78

Notes:

Apprentice to Journeyworker Ratio:1:1

TELECOMMUNICATION TECHNICIAN *ELECTRICIANS LOCAL 7*	06/27/2021	$45.21	$11.75	$13.26	$0.00	$70.22
	01/02/2022	$45.81	$12.00	$13.42	$0.00	$71.23
	07/03/2022	$46.41	$12.25	$13.69	$0.00	$72.35
	01/01/2023	$47.01	$12.50	$13.96	$0.00	$73.47

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *TELECOMMUNICATION TECHNICIAN - Local 7*

Effective Date - 06/27/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$18.08	$6.45	$0.54	$0.00	$25.07
2	45	$20.34	$6.45	$0.61	$0.00	$27.40
3	50	$22.61	$11.75	$7.08	$0.00	$41.44
4	55	$24.87	$11.75	$7.15	$0.00	$43.77
5	65	$29.39	$11.75	$8.93	$0.00	$50.07
6	70	$31.65	$11.75	$10.10	$0.00	$53.50

Effective Date - 01/02/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$18.32	$6.60	$0.54	$0.00	$25.46
2	45	$20.61	$6.60	$0.61	$0.00	$27.82
3	50	$22.91	$12.00	$7.13	$0.00	$42.04
4	55	$25.20	$12.00	$7.20	$0.00	$44.40
5	65	$29.78	$12.00	$9.01	$0.00	$50.79
6	70	$32.07	$12.00	$10.20	$0.00	$54.27

Notes:

Steps are 800 hours

Apprentice to Journeyworker Ratio:1:1

TERRAZZO FINISHERS *BRICKLAYERS LOCAL 3 (SPR/PITT) - MARBLE & TILE*	08/01/2021	$56.09	$11.39	$22.25	$0.00	$89.73
	02/01/2022	$56.68	$11.39	$22.25	$0.00	$90.32

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *TERRAZZO FINISHER-Local 3 Marble/Tile (Spr/Ptt)*

Effective Date - 08/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.05	$11.39	$22.25	$0.00	$61.69
2	60	$33.65	$11.39	$22.25	$0.00	$67.29
3	70	$39.26	$11.39	$22.25	$0.00	$72.90
4	80	$44.87	$11.39	$22.25	$0.00	$78.51
5	90	$50.48	$11.39	$22.25	$0.00	$84.12

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.34	$11.39	$22.25	$0.00	$61.98
2	60	$34.01	$11.39	$22.25	$0.00	$67.65
3	70	$39.68	$11.39	$22.25	$0.00	$73.32
4	80	$45.34	$11.39	$22.25	$0.00	$78.98
5	90	$51.01	$11.39	$22.25	$0.00	$84.65

Notes:

Apprentice to Journeyworker Ratio:1:5

TERRAZZO MECHANIC *BRICKLAYERS LOCAL 3 (SPR/PITT) - MARBLE & TILE*	08/01/2021	$57.17	$11.39	$22.24	$0.00	$90.80
	02/01/2022	$57.74	$11.39	$22.24	$0.00	$91.37

Apprentice - *TERRAZZO MECH - Local 3 Marble/Tile (Spr/Pitt)*

Effective Date - 08/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.59	$11.39	$22.24	$0.00	$62.22
2	60	$34.30	$11.39	$22.24	$0.00	$67.93
3	70	$40.02	$11.39	$22.24	$0.00	$73.65
4	80	$45.74	$11.39	$22.24	$0.00	$79.37
5	90	$51.45	$11.39	$22.24	$0.00	$85.08

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.87	$11.39	$22.24	$0.00	$62.50
2	60	$34.64	$11.39	$22.24	$0.00	$68.27
3	70	$40.42	$11.39	$22.24	$0.00	$74.05
4	80	$46.19	$11.39	$22.24	$0.00	$79.82
5	90	$51.97	$11.39	$22.24	$0.00	$85.60

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TEST BORING DRILLER *LABORERS - FOUNDATION AND MARINE*	06/01/2021	$42.07	$8.60	$17.72	$0.00	$68.39
	12/01/2021	$43.08	$8.60	$17.72	$0.00	$69.40
For apprentice rates see "Apprentice- LABORER"						
TEST BORING DRILLER HELPER *LABORERS - FOUNDATION AND MARINE*	06/01/2021	$40.79	$8.60	$17.72	$0.00	$67.11
	12/01/2021	$41.80	$8.60	$17.72	$0.00	$68.12
For apprentice rates see "Apprentice- LABORER"						
TEST BORING LABORER *LABORERS - FOUNDATION AND MARINE*	06/01/2021	$40.67	$8.60	$17.72	$0.00	$66.99
	12/01/2021	$41.68	$8.60	$17.72	$0.00	$68.00
For apprentice rates see "Apprentice- LABORER"						
TRACTORS *OPERATING ENGINEERS LOCAL 98*	06/01/2021	$35.90	$12.47	$14.50	$0.00	$62.87
	12/01/2021	$36.73	$12.47	$14.50	$0.00	$63.70
	06/01/2022	$37.60	$12.47	$14.50	$0.00	$64.57
	12/01/2022	$38.48	$12.47	$14.50	$0.00	$65.45
	06/01/2023	$39.43	$12.47	$14.50	$0.00	$66.40
	12/01/2023	$40.38	$12.47	$14.50	$0.00	$67.35
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TRAILERS FOR EARTH MOVING EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2021	$36.82	$13.41	$14.82	$0.00	$65.05
	12/01/2021	$36.82	$13.41	$16.01	$0.00	$66.24
TUNNEL WORK - COMPRESSED AIR *LABORERS (COMPRESSED AIR)*	06/01/2021	$52.90	$8.60	$18.17	$0.00	$79.67
	12/01/2021	$53.91	$8.60	$18.17	$0.00	$80.68
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) *LABORERS (COMPRESSED AIR)*	06/01/2021	$54.90	$8.60	$18.17	$0.00	$81.67
	12/01/2021	$55.91	$8.60	$18.17	$0.00	$82.68
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR *LABORERS (FREE AIR TUNNEL)*	06/01/2021	$44.97	$8.60	$18.17	$0.00	$71.74
	12/01/2021	$45.98	$8.60	$18.17	$0.00	$72.75
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR (HAZ. WASTE) *LABORERS (FREE AIR TUNNEL)*	06/01/2021	$46.97	$8.60	$18.17	$0.00	$73.74
	12/01/2021	$47.98	$8.60	$18.17	$0.00	$74.75
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2021	$36.24	$13.41	$14.82	$0.00	$64.47
	12/01/2021	$36.24	$13.41	$16.01	$0.00	$65.66
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	06/01/2021	$30.31	$8.60	$14.69	$0.00	$53.60
	12/01/2021	$31.12	$8.60	$14.69	$0.00	$54.41
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
WATER METER INSTALLER *PLUMBERS & PIPEFITTERS LOCAL 104 WESTERN DIVISION*	09/17/2021	$43.46	$9.55	$17.10	$0.00	$70.11
	03/17/2022	$44.71	$9.55	$17.10	$0.00	$71.36
	09/17/2022	$45.71	$9.55	$17.10	$0.00	$72.36
	03/17/2023	$46.96	$9.55	$17.10	$0.00	$73.61
	09/17/2023	$47.96	$9.55	$17.10	$0.00	$74.61
	03/17/2024	$49.21	$9.55	$17.10	$0.00	$75.86
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						
Outside Electrical - West						
EQUIPMENT OPERATOR *OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42*	09/01/2019	$44.67	$8.00	$12.55	$0.00	$65.22
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN *OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42*	09/01/2019	$30.58	$8.00	$5.48	$0.00	$44.06

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN / TRUCK DRIVER *OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42*	09/01/2019	$39.97	$8.00	$10.96	$0.00	$58.93
For apprentice rates see "Apprentice- LINEMAN"						
HEAVY EQUIPMENT OPERATOR *OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42*	09/01/2019	$47.01	$8.00	$13.22	$0.00	$68.23
For apprentice rates see "Apprentice- LINEMAN"						
JOURNEYMAN LINEMAN *OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42*	09/01/2019	$51.71	$8.00	$15.55	$0.00	$75.26

Apprentice - *LINEMAN (Outside Electrical) - West Local 42*

Effective Date - 09/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$31.03	$8.00	$3.43	$0.00	$42.46
2	65	$33.61	$8.00	$3.51	$0.00	$45.12
3	70	$36.20	$8.00	$3.59	$0.00	$47.79
4	75	$38.78	$8.00	$5.16	$0.00	$51.94
5	80	$41.37	$8.00	$5.24	$0.00	$54.61
6	85	$43.95	$8.00	$5.32	$0.00	$57.27
7	90	$46.54	$8.00	$7.40	$0.00	$61.94

Notes:

Apprentice to Journeyworker Ratio:1:2

TELEDATA CABLE SPLICER *OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42*	02/04/2019	$30.73	$4.70	$3.17	$0.00	$38.60
TELEDATA LINEMAN/EQUIPMENT OPERATOR *OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77
TELEDATA WIREMAN/INSTALLER/TECHNICIAN *OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77
TRACTOR-TRAILER DRIVER *OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42*	09/01/2019	$44.67	$8.00	$12.55	$0.00	$65.22

Additional Apprentice Information:

Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the pre-determined hourly wage rate established by the Commissioner under the provisions of the M.G.L. c. 149, ss. 26-27D. Apprentice ratios are established by the Division of Apprenticeship Training pursuant to M.G.L. c. 23, ss. 11E-11L.

All apprentices must be registered with the Division of Apprenticeship Training in accordance with M.G.L. c. 23, ss. 11E-11L.

All steps are six months (1000 hours.)
Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

** Multiple ratios are listed in the comment field.
*** APP to JM; 1:1, 2:2, 2:3, 3:4, 4:4, 4:5, 4:6, 5:7, 6:7, 6:8, 6:9, 7:10, 8:10, 8:11, 8:12, 9:13, 10:13, 10:14, etc.
**** APP to JM; 1:1, 1:2, 2:3, 2:4, 3:5, 4:6, 4:7, 5:8, 6:9, 6:10, 7:11, 8:12, 8:13, 9:14, 10:15, 10:16, etc.

ATTACHMENT B
OWNER-CONTRACTOR AGREEMENT

TOWN OF EGREMONT

Contract for Egremont Free Library ADA Improvements Project

Monetary Limits: $_____

DATE: _____

This Contract is entered into on, or as of, this date by and between the Town of Egremont, 171 Egremont Plain Road, Egremont, MA 01258 (the "Town"), and

_____
["Contractor"]

_____
[Contact Name for Responsible Person]

_____

_____

_____
[Address of the Contractor]

_____ _____
[Telephone Number] [FAX Number]

_____
[email address]

1. This is a Contract for the procurement of the following:
Stabilization of first floor timber framing and belfry construction. Installation of exterior site accessibility improvements including parking, accessible route and ramp. Renovation of interior toilet rooms for ADA compliance. (Lump sum bid)

If this is a construction contract, Supplement C must be completed, executed and attached hereto.

2. The Contract price to be paid to the Contractor by the Town is:

3. Payment will be made as follows:

3.1 If any portion of the contract price is to be paid by a private citizen(s) no work shall be performed until a sum has been deposited with the Town Treasurer, upon an estimate made by the board, committee or officer having charge of the work, sufficient to cover the payment for the portion of the said work chargeable to the private citizen(s).

3.2 Fees and Reimbursable Costs combined shall not exceed $___0___as more fully set forth in the Contractor Documents.

3.3 There shall be no further costs, fees or reimbursable charges due the Contractor under this Contract unless said fees and/or costs are so set forth in writing. The Town will not pay any surcharge or premium on top of the direct out of pocket expenses, if any.

3.4 Final payment including any unpaid balance of the Contractor's compensation shall be due and payable when the Project/Goods/Services is/are delivered to the Town when the project is completed and the services are complete and/or the goods are delivered and accepted.

4. Security

4.1 In the event the contract price exceeds the sum of $10,000.00, the Contractor must provide security in the form of a 100% bond or otherwise, conditioned upon the faithful performance of this Contract.

5. Definitions:

5.1 Acceptance: All Contracts require proper acceptance of the described goods or services by the Town. Proper acceptance shall be understood to include inspection of goods and certification of acceptable performance for services by authorized representatives of the Town to ensure that the goods or services are complete and are as specified in the Contract.

5.2 Contract Documents: All documents relative to the Contract including (where used) Request for Proposals and all attachments thereto, Instructions to Bidders, Proposal Form, General Conditions, Supplementary General Conditions, General Specifications, Other Specifications included in Project Manual, Drawings, all Addenda issued during the bidding period and Contractor's Response to the Request for Proposal. The Contract documents are complementary, and what is called for by any one shall be as binding as if called for by all. The intention of the document is to include all labor and materials, equipment and transportation necessary for the proper performance of the Contract.

5.3 The Contractor: The "other party" to any Contract with the Town. This term shall (as the sense and particular Contract so require) include Vendor, Contractor, Engineer, or other label used to identify the other party in the particular Contract. Use of the term "Contractor" shall be understood to refer to any other such label used.

5.4 Date of Substantial Performance: The date when the work is sufficiently complete, the services are performed, or the goods delivered, in accordance with Contract documents, as modified by approved Amendments and Change Orders.

5.5 Goods: Goods, Supplies, Services or Materials.

5.6 Subcontractor: Those having a direct Contract with the Contractor. The term includes one who furnished material worked to a special design according to the Drawings or Specifications of this work, but does not include one who merely furnishes material not so worked.

5.7 Work: The services or materials contracted for, or both.

6. Term of Contract and Time for Performance:

This Contract shall be fully performed by the Contractor in accordance with the provisions of the Contract Documents on or before **June 1, 2022**, unless extended, in writing, at the sole discretion of the Town, and not subject to assent by the Contractor, and subject to the availability and appropriation of funds as certified by the Town Accountant. Time is of the essence for the completion of the Contract.

7. Subject to Appropriation:

Notwithstanding anything in the Contract documents to the contrary, any and all payments which the Town is required to make under this Contract shall be subject to appropriation or other availability of funds as certified by the Town Accountant. In the absence of appropriation or availability as certified herein, this Contract shall be immediately terminated without liability for damages, penalties or other charges to the Town. In the event this is a multi-year contract, this Contract shall be subject to annual appropriation and in the event that funds are not so appropriated, this Contract shall terminate immediately without liability for damages, penalties or charges to the Town.

8. Permits and Approvals:

Permits, Licenses, Approvals and all other legal or administrative prerequisites to its performance of the Contract shall be secured and paid for by the Contractor.

9. Termination and Default:

9.1 Without Cause. The Town may terminate this Contract on seven (7) calendar days notice when in the Town's sole discretion it determines it is in the best interests of the

Town to do so, by providing notice to the Contractor, which shall be in writing and shall be deemed delivered and received when given in person to the Contractor, or when received by fax, express mail, certified mail return receipt requested, regular mail postage prepaid or delivered by any other appropriate method evidencing actual receipt by the Contractor. Upon termination without cause, Contractor will be paid for services rendered to the date of termination.

9.2 For Cause. If the Contractor is determined by the Town to be in default of any term or condition of this Contract, the Town may terminate this Contract on seven (7) days notice by providing notice to the Contractor, which shall be in writing and shall be deemed delivered and received when given in person to the Contractor, or when received by fax, express mail, certified mail return receipt requested, regular mail postage prepaid or delivered by any other appropriate method evidencing actual receipt by the Contractor.

9.3 Default. The following shall constitute events of a default under the Contract:

any material misrepresentation made by the Contractor to the Town; 2) any failure to perform any of its obligations under this Contract including, but not limited to the following: (i) failure to commence performance of this Contract at the time specified in this Contract due to a reason or circumstance within the Contractor's reasonable control, (ii) failure to perform this Contract with sufficient personnel and equipment or with sufficient material to ensure the completion of this Contract within the specified time due to a reason or circumstance within the Contractor's reasonable control, (iii) failure to perform this Contract in a manner reasonably satisfactory to the Town, (iv) failure to promptly re-perform within a reasonable time the services that were rejected by the Town as unsatisfactory, or erroneous, (v) discontinuance of the services for reasons not beyond the Contractor's reasonable control, (vi) failure to comply with a material term of this Contract, including, but not limited to, the provision of insurance and non-discrimination, (vii) any other acts specifically and expressly stated in this Contract as constituting a basis for termination of this Contact, and (viii) failure to comply with any and all requirements of state law and/or regulations, and Town bylaw and/or regulations.

10. Suspension or Delay

The Town may order the Contractor, in writing, to suspend, delay or interrupt all or any part of the Services without cause for such period of time as the Town may determine to be appropriate for its convenience. In the event of any such suspension, delay or interruption, the Contractor's compensation shall be equitably adjusted. No adjustment shall be made if the Contractor is or otherwise would have been responsible for the suspension, delay or interruption of the Services, or if another provision of this Contract is applied to render an equitable adjustment.

11. The Contractor's Breach and the Town's Remedies:

Failure of the Contractor to comply with any of the terms or conditions of this Contract shall be deemed a material breach of this Contract, and the Town of Egremont shall have all the rights and remedies provided in the Contract documents, the right to cancel, terminate, or suspend the

Contract in whole or in part, the right to maintain any and all actions at law or in equity or other proceedings with respect to a breach of this Contract, including "Damages" including but not limited to costs, attorney's fees or other damages resulting form said breach ("Damages") as well as specific performance, and the right to select among the remedies available to it by all of the above.

From any sums due to the Contractor for services, the Town may keep the whole or any part of the amount for expenses, losses and Damages incurred by the Town as a consequence of procuring services as a result of any failure, omission or mistake of the Contractor in providing services as provided in this Contract.

12. Statutory Compliance:

12.1 This Contract will be construed and governed by the provisions of applicable federal, state and local laws and regulations; and wherever any provision of the Contract or Contract documents shall conflict with any provision or requirement of federal, state or local law or regulation, then the provisions of law and regulation shall control. Where applicable to the Contract, the provisions of the General Laws are incorporated by reference into this Contract, including, but not limited to, the following:

General Laws Chapter 30B – Procurement of Goods and Services.

General Laws Chapter 30, Sec. 39, *et seq*: - Public Works Contracts.

General Laws Chapter 149, Section 44A, *et seq*: Public Buildings Contracts.

12.2 Wherever applicable law mandates the inclusion of any term and provision into a municipal contract, this Section shall be understood to import such term or provision into this Contract. To whatever extent any provision of this Contract shall be inconsistent with any law or regulation limiting the power or liability of cities and towns, such law or regulation shall control.

12.3 The Contractor shall comply with all Federal, State and local laws, rules, regulations, policies and orders applicable to the Work provided pursuant to this Contract, such provisions being incorporated herein by reference, and shall be responsible for obtaining all necessary licenses, permits, and approvals required for the supply of such Work.

The Contractor shall indemnify and hold the Town harmless for and against any and all fines, penalties or monetary liabilities incurred by the Town as a result of the failure of the Contractor to comply with the previous sentence. If any discrepancy or inconsistency is discovered in the Drawings, Specifications or Contract for this work in violation of any such law, by-law, regulation, order or decree, it shall forthwith report the same in writing to the Town. It shall, at all times, itself observe and comply with all such existing and future laws, by-laws, regulations, orders and decrees; and shall protect and indemnify the Town, and its duly appointed agents against any claim or liability arising from or based on any

violation whether by him or its agents, employees or subcontractors of any such law, by-law, regulation or decree.

13. Conflict of Interest:

Both the Town and the Contractor acknowledge the provisions of the State Conflict of Interest Law (General Laws Chapter 268A), and this Contract expressly prohibits any activity which shall constitute a violation of that law. The Contractor shall be deemed to have investigated the application of M.G.L. c. 268A to the performance of this Contract; and by executing the Contract documents the Contractor certifies to the Town that neither it nor its agents, employees, or subcontractors are thereby in violation of General Laws Chapter 268A.

14. Certification of Tax Compliance

This Contract must include a certification of tax compliance by the Contractor, as required by General Laws Chapter 62C, Section 49A (Requirement of Tax Compliance by All Contractors Providing Goods, Services, or Real Estate Space to the Commonwealth or Subdivision).

15. Non-Discrimination/Affirmative Action

The Contractor shall carry out the obligations of this Agreement in compliance with all requirements imposed by or pursuant to federal, State and local ordinances, statutes, rules and regulations and policies prohibiting discrimination in employment, including but not limited to, Title VII of the Civil Rights Act of 1964; the Age Discrimination in Employment Act of 1967; Section 504 of the Rehabilitation Act of 1973 and Mass. G. L. c. 151B, and any other executive orders, rules, regulations, requirements and policies relating thereto enacted by the Commonwealth of Massachusetts and the Town as they may be amended from time to time. Contractor shall not discriminate against any qualified employee or applicant for employment because of race, color, national origin, ancestry, ace, sex, religion, physical or mental handicap or sexual orientation.

The following provisions will not apply if the contract price is less than $10,000.00 or where the Contractor employs fewer than six (6) persons. [The Town may, on a case by case basis, determine that the following provisions apply to contracts for less than $10,000.00 or where the Contractor employs less than six (6) employees.]

15.1 As used in this section "affirmative action" means positive steps to ensure all qualified persons equal employment opportunity without regard to race, color, religion, sex or national origin at all stages of the employment process: recruitment, section, placement, promotion, training, layoff and termination. It may include, but is not limited to, the following:

(a) Inclusion in all solicitation and advertisements for employees of a statement that the Contractor is an "Equal Opportunity Employer";
(b) Placement of solicitations and advertisements for employees in media that reaches minority groups;
(c) Notification in writing of all recruitment sources that the Contractor solicits the referral of applicants without regard to race, color, religion, sex or national origin;

(d) Direct solicitation of the support of responsible and appropriate community, state and federal agencies to assist recruitment efforts;
(e)Participation in, or establishment of, apprenticeship or training programs where outside programs are inadequate or unavailable to minority groups;
(f) Modification of collective bargaining agreements to eliminate restrictive barriers established by dual lines of seniority, dual rates of pay or dual lines of promotion or progression which are based on race, color, religion, sex or national origin; and
(g) Review selection, placement, promotion, training, layoff and termination procedures and requirements to ensure that they do not intentionally or unintentionally discriminate against qualified persons because of race, color, religion, sex or national origin.

15.2 The Contractor shall include in all compliance and progress reports submitted to the town a report which shall include: (a) A certificate stating that he or she is currently in compliance with the provisions of G.L. c. 152B and setting forth the Affirmative Action he or she is currently undertaking and will undertake during the contract period to provide equal employment opportunity for all qualified persons without regard to race, color, religion, sex or national origin; and (b) A statement in wiring supporting information signed by an authorized officer or agent on behalf of any labor union or other agency which refers workers or provides or supervises apprenticeship or other training programs which the Contractor deals, to the effect that the union or other agency's practices and policies do not discriminate on the basis of race, color, religion, sex or national origin; provided, in the event that the union or other agency shall refuse to execute such a statement, the Contractor need only so certify in writing.

15.3 A copy of any such report as described above, shall be filed in the office of the Town Clerk and shall upon said filing become a public record.

15.4 The Contractor will take Affirmative Action to ensure that employees are solicited and employed, and that employees are treated during employment, without regard to race, color, religion, sex or national origin.

15.5 The Contractor will in all solicitation 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.

15.6 In determining whether steps taken by the Contractor constitute Affirmative Action, the Town shall take into account the relevant characteristics of the Contractor including, but not limited to, the number of employees and the location of the principal and branch offices.

16. Assignment:

The Contractor shall not assign, sublet or otherwise transfer this Agreement, in whole or in part, without the prior written consent of the Town, and shall not assign any of the moneys payable under this Contract, except by and with the written consent of the Town.

17. Condition of Enforceability Against the Town:

This Contract is only binding upon, and enforceable against, the Town if: (1) the Contract is signed by the Board of Selectmen or its designee; and (2) endorsed with approval by the Town Accountant as to appropriation or availability of funds; and (3) endorsed with approval by the Town Counsel as to form.

18. Corporate Contractor:

If the Contractor is a corporation, it shall endorse upon this Contract (or attach hereto) its Clerk's Certificate certifying the corporate capacity and authority of the party signing this Contract for the corporation. Such certificate shall be accompanied by a letter or other instrument stating that such authority continues in full force and effect as of the date the Contract is executed by the Contractor. This Contract shall not be enforceable against the Town of Egremont unless and until the Contractor complies with this section.

The Contractor, if a foreign corporation, shall file with the Commissioner of Corporations a Power of Attorney and duly authenticated copies of its Charter or Certificate of Incorporation; and said Contractor shall comply with all the laws of the Commonwealth.

19. Contractor's Personnel:

The Contractor shall utilize only its employees and shall not utilize any third-party contractors without prior written approval of the Town.

20. Liability of Public Officials:

To the full extent permitted by law, no official, employee, agent or representative of the Town of Egremont shall be individually or personally liable on any obligation of the Town under this Contract.

21. Indemnification:

The Contractor shall indemnify, defend and save harmless the Town, the Town's officers, agents and employees, from and against any and all damages, liabilities, actions, suits, proceedings, claims, demands, losses, costs, expenses, recoveries and judgments of every nature and description (including attorneys' fees) that may arise in whole or in part out of or in connection with the work being performed or to be performed, or out of any act or omission by the Contractor, its employees, agents, subcontractors, material men, and 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 any party indemnified hereunder. The Contractor further agrees to reimburse the Town for damage to its property caused by the Contractor, its employees, agents, subcontractors or material men, and anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, including damages caused by his, its or their use of faulty, defective, or unsuitable material or equipment, unless the damage is caused by the Town's gross negligence or willful misconduct.

21.1 The Contractor further agrees to indemnify and hold harmless the Town, including the agents, employees and representatives of either, from and against all claims, damages, losses and expenses, including attorney's fees, arising out of or resulting from the performance of the work, provided that any such claim, damage, loss or expense (a) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property including the loss of use resulting therefrom and (b) is caused in whole or in part by any negligent act or omission of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.

21.2 The Contractor shall be responsible for all damage or injury to property of any character during the prosecution of the work resulting from any act, omission, neglect, or misconduct in the manner or method of executing the work or due to the non-execution of the work or at any time due to defective work or materials.

21.3 In any and all claims against the town or any of their agents or employees by any employee of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under this paragraph shall not be limited in anyway by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any Subcontractor under workmen's Compensation Acts, disability benefit acts or other employee benefit acts.

21.4 The Contractor hereby assumes the entire responsibility and liability for any and all injury to or death of any or all persons, including the Contractor's employees, and for any and all damage to property caused by, resulting from or arising in whole or in part out of any act, omission, or neglect on the part of the Contractor or of any Subcontractor or of anyone directly or indirectly employed by any of them, or of anyone for whose acts any of them may be liable in connection with operations under the Contract.

The foregoing provisions shall not be deemed to be released, waived, limit or modified in any respect by reason of any surety or insurance provided by the Contractor under the Contract.

22. Insurance

22.1 Workers Compensation Insurance:

The Contractor shall provide Workers Compensation Insurance in the amount of $1,000,000.00/$1,000,000.00/$1,000,000.00 to all employees of the Contractor who are subject to the provisions of Chapter 152 of the General Laws of Massachusetts.

Failure to provide and continue in force such insurance during the period of this Contract shall be deemed a material breach of this Contract, shall operate as an immediate termination thereof, and Contractor shall indemnify the Town for all losses, claims, and actions resulting from the failure to provide the insurance required by this Article.

The Contractor shall furnish to the Town a certificate evidencing such insurance prior to the execution of this Contract before the same shall be binding on the parties thereto, except if specifically waived by the Town.

22.2 Professional Liability Insurance

Liability of $1 million per claim and $3 million aggregate.

Failure to provide and continue in force such insurance during the period of this Contract shall be deemed a material breach of this Contract, shall operate as an immediate termination thereof, and Contractor shall indemnify the Town for all losses, claims, and actions resulting from the failure to provide the insurance required by this Article.

22.3 Other Insurance Requirements

a. Comprehensive commercial general liability insurance with limits of at least $1 Million per occurrence and $3 Million annual aggregate for property damage and $1 Million per person and $3 Million per occurrence for bodily injury, which shall include the Town of Egremont as an additional insured, and which shall cover bodily injury, sickness or disease, or death of any person including employees and those persons other than the Contractor's employees, and claims insured by usual personal liability coverage, death, or property damage arising out of the Work including injury or destruction of tangible property, including loss of use resulting therefrom.

b. Motor vehicle insurance for any motor vehicles used in performing the Work, with limits of at least $500,000 per person, and $1 Million per accident.

c. The intent of the Specifications regarding insurance is to specify minimum coverage and minimum limits of liability acceptable under the Contract. However, it shall be the Contractor's responsibility to purchase and maintain insurance of such character and in such amounts as will adequately protect it and the Town from and against all claims, damages, losses and expenses resulting from exposure to any casualty liability in the performance of the work, including and not limited to Professional liability insurance where applicable.

d. All policies shall identify the Town as an additional insured (except Workers' Compensation). The Contractor shall notify the Town immediately upon the cancellation or amendment to any policy. Renewal Certificates shall be filed with the Town at least ten (10) days prior to the expiration of the required policies. Certificates evidencing all such coverage shall be provided to the Town upon the execution of this Agreement, and upon the renewal of any such coverage. Each such certificate shall specifically refer to this Contract and shall state that such

insurance is as required by this Contract. **Failure to provide the notices required in this Section or to continue in force such insurance shall be deemed a material breach of this Contract and shall be grounds for immediate termination**. Said insurance shall include: Workers Compensation/Employers' Liability Insurance, Business Automobile Liability Insurance, and Commercial General Liability Insurance (CGL). The CGL policy shall include coverage for liability arising from premises, operations, independent Contractors, personal injury, contractual liability. All Certificates of Insurance shall be on the "MIIA" or "ACORD" Certificate of Insurance form, shall contain true transcripts from the policies, authenticated by the proper officer of the Insurer, evidencing in particular those insured, the extent of coverage, the location and operations to which the insurance applies, the expiration date and the above-mentioned notice clauses. All insurance shall be written on an occurrence basis. Coverage's shall be maintained without interruption from date of the Contract until date of final payment and termination of any coverage required to be maintained after payment.

e. The Contractor shall obtain and maintain during the term of this Contract the insurance coverage in companies licensed to do business in the Commonwealth of Massachusetts and acceptable to the Town.

23. Documents, Materials, Etc.

Any materials, reports, information, data, etc. given to or prepared or assembled by the Contractor under this Contract are to be kept confidential and shall not be made available to any individual or organization by the Contractor (except agents, servants, or employees of the Contractor) without the prior written approval of the Town, except as otherwise required by law. The Contractor shall comply with the provisions Chapter 66A of the General Laws of Massachusetts as it relates to public documents, and all other state and federal laws and regulations relating to confidentiality, security, privacy and use of confidential data.

Any materials produced in whole or in part under this Contract shall not be subject to copyright, except by the Town, in the United States or any other country. The Town shall have unrestricted authority to, without payment of any royalty, commission, or additional fee of any type or nature, publicly disclose, reproduce, distribute and otherwise use, and authorize others to use, in whole or in part, any reports, data or other materials prepared under this Contract.

All data, reports, programs, software, equipment, furnishings, and any other documentation or product paid for by the Town shall vest in the Town at the termination of this Contract. The Contractor shall at all times, during or after termination of this Contract, obtain the prior written approval of the Town before making any statement bearing on the work performed or data collected under this Contract to the press or issues any material for publication through any medium.

24. No Employment

The Contractor acknowledges and agrees that it is acting as an independent Contractor for all

services rendered pursuant to this Contract, and neither the Contractor, nor its employees, agents, servants nor any person for whose conduct the Contractor is responsible shall be considered an employee or agent of the Town for any purpose and shall not file any claim or bring any action for any worker's compensation unemployment benefits and compensation for which they may otherwise be eligible as a Town employee as a result of work performed pursuant to the terms of this Contract.

25. Audit, Inspection and Recordkeeping

At any time during normal business hours, and as often as the Town may deem it reasonably necessary, there shall be available in the office of the Contractor for the purpose of audit, examination, and/or to make excerpts or transcript all records, contracts, invoices, materials, payrolls, records of personnel, conditions of employment and other data relating to all matters covered by this Agreement.

26. Payment

The Town agrees to make all reasonable efforts to pay to the Contractor the sum set forth in the Contractor's bid or proposal within thirty (30) days of receipt of an invoice detailing the work completed and acceptance from the Town of the work completed.

27. Waiver and Amendment

Amendments, or waivers of any additional term, condition, covenant, duty or obligation contained in this Contract may be made only by written amendment executed by all signatories to the original Agreement, prior to the effective date of the amendment.

To the extent allowed by law, any conditions, duties, and obligations contained in this Contract may be waived only by written Agreement by both parties.

Forbearance or indulgence in any form or manner by a party shall not be construed as a waiver, nor in any manner limit the legal or equitable remedies available to that party. No waiver by either party of any default or breach shall constitute a waiver of any subsequent default or breach of a similar or different matter.

28. Severability

If any term or condition of this Contract or any application thereof shall to any extent be held invalid, illegal or unenforceable by the court of competent jurisdiction, the validity, legality, and enforceability of the remaining terms and conditions of this Contract shall not be deemed affected thereby unless one or both parties would be substantially or materially prejudiced.

29. Forum and Choice of Law

This Contract and any performance herein shall be governed by and be construed in accordance with the laws of the Commonwealth. Any and all proceedings or actions relating to subject matter herein shall be brought and maintained in the courts of the Commonwealth or the federal

district court sitting in the Commonwealth, which shall have exclusive jurisdiction thereof. This paragraph shall not be construed to limit any other legal rights of the parties.

30. Notices

Any notice permitted or required under the provisions of this Contract to be given or served by either of the parties hereto upon the other party hereto shall be in writing and signed in the name or on the behalf of the party giving or serving the same. Notice shall be deemed to have been received at the time of actual service or three (3) business days after the date of a certified or registered mailing properly addressed. Notice to the Contractor shall be deemed sufficient if sent to the address set forth on page 1 or furnished from time to time in writing hereafter.

31. Binding on Successors:

This Contract is binding upon the parties hereto, their successors, assigns and legal representatives (and where not corporate, the heirs and estate of the Contractor). Neither the Town nor the Contractor shall assign or transfer any interest in the Contract without the written consent of the other.

32. Entire Agreement:

This Contract, including all documents incorporated herein by reference, constitutes the entire integrated agreement between the parties with respect to the matters described. This Contract supersedes all prior agreements, negotiations and representations, either written or oral, and it shall not be modified or amended except by a written document executed by the parties hereto.

IN WITNESS WHEREOF the parties have hereto and to two other identical instruments set forth their hands and executed this as an instrument under seal this the day and year first above written.

The Town of Egremont
By the Board of Selectmen

_____
Signature Date

_____
Signature Date

_____
Signature Date

The Contractor by:

_____
Signature Date

_____
Print Name & Title

Certified as to Form:

_____
Town Counsel Date

Certified as to
Appropriation/Availability of Funds:

_____
Town Accountant Date

CERTIFICATION OF GOOD FAITH

The undersigned certifies under pains and penalties of perjury that this contract has been obtained 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.

The Contractor by: _____
Print Name

_____
Title/Authority

CERTIFICATE OF STATE TAX COMPLIANCE

Pursuant to Massachusetts General Laws, Chapter 62C, Section 49A

_____, authorized signatory for
name of signatory
_____, whose
name of contractor
principal place of business is at _____,

_____does hereby certify under the pains and penalties of perjury

that _____ has paid all
name of contractor
Massachusetts taxes and has complied with all laws of the Commonwealth of Massachusetts relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

_____
Signature Date

ATTACHMENT B
OWNER-CONTRACTOR AGREEMENT

TOWN OF EGREMONT

Contract for Egremont Free Library ADA Improvements Project

Monetary Limits: $_____

DATE: _____

This Contract is entered into on, or as of, this date by and between the Town of Egremont, 171 Egremont Plain Road, Egremont, MA 01258 (the "Town"), and

_____
["Contractor"]

_____
[Contact Name for Responsible Person]

_____

_____

_____
[Address of the Contractor]

_____ _____
[Telephone Number] [FAX Number]

_____
[email address]

1. This is a Contract for the procurement of the following:
Stabilization of first floor timber framing and belfry construction. Installation of exterior site accessibility improvements including parking, accessible route and ramp. Renovation of interior toilet rooms for ADA compliance. (Lump sum bid)

If this is a construction contract, Supplement C must be completed, executed and attached hereto.

2. The Contract price to be paid to the Contractor by the Town is:

3. Payment will be made as follows:

3.1 If any portion of the contract price is to be paid by a private citizen(s) no work shall be performed until a sum has been deposited with the Town Treasurer, upon an estimate made by the board, committee or officer having charge of the work, sufficient to cover the payment for the portion of the said work chargeable to the private citizen(s).

3.2 Fees and Reimbursable Costs combined shall not exceed $___0___as more fully set forth in the Contractor Documents.

3.3 There shall be no further costs, fees or reimbursable charges due the Contractor under this Contract unless said fees and/or costs are so set forth in writing. The Town will not pay any surcharge or premium on top of the direct out of pocket expenses, if any.

3.4 Final payment including any unpaid balance of the Contractor's compensation shall be due and payable when the Project/Goods/Services is/are delivered to the Town when the project is completed and the services are complete and/or the goods are delivered and accepted.

4. Security

4.1 In the event the contract price exceeds the sum of $10,000.00, the Contractor must provide security in the form of a 100% bond or otherwise, conditioned upon the faithful performance of this Contract.

5. Definitions:

5.1 Acceptance: All Contracts require proper acceptance of the described goods or services by the Town. Proper acceptance shall be understood to include inspection of goods and certification of acceptable performance for services by authorized representatives of the Town to ensure that the goods or services are complete and are as specified in the Contract.

5.2 Contract Documents: All documents relative to the Contract including (where used) Request for Proposals and all attachments thereto, Instructions to Bidders, Proposal Form, General Conditions, Supplementary General Conditions, General Specifications, Other Specifications included in Project Manual, Drawings, all Addenda issued during the bidding period and Contractor's Response to the Request for Proposal. The Contract documents are complementary, and what is called for by any one shall be as binding as if called for by all. The intention of the document is to include all labor and materials, equipment and transportation necessary for the proper performance of the Contract.

5.3 The Contractor: The "other party" to any Contract with the Town. This term shall (as the sense and particular Contract so require) include Vendor, Contractor, Engineer, or other label used to identify the other party in the particular Contract. Use of the term "Contractor" shall be understood to refer to any other such label used.

5.4 Date of Substantial Performance: The date when the work is sufficiently complete, the services are performed, or the goods delivered, in accordance with Contract documents, as modified by approved Amendments and Change Orders.

5.5 Goods: Goods, Supplies, Services or Materials.

5.6 Subcontractor: Those having a direct Contract with the Contractor. The term includes one who furnished material worked to a special design according to the Drawings or Specifications of this work, but does not include one who merely furnishes material not so worked.

5.7 Work: The services or materials contracted for, or both.

6. Term of Contract and Time for Performance:

This Contract shall be fully performed by the Contractor in accordance with the provisions of the Contract Documents on or before **June 1, 2022**, unless extended, in writing, at the sole discretion of the Town, and not subject to assent by the Contractor, and subject to the availability and appropriation of funds as certified by the Town Accountant. Time is of the essence for the completion of the Contract.

7. Subject to Appropriation:

Notwithstanding anything in the Contract documents to the contrary, any and all payments which the Town is required to make under this Contract shall be subject to appropriation or other availability of funds as certified by the Town Accountant. In the absence of appropriation or availability as certified herein, this Contract shall be immediately terminated without liability for damages, penalties or other charges to the Town. In the event this is a multi-year contract, this Contract shall be subject to annual appropriation and in the event that funds are not so appropriated, this Contract shall terminate immediately without liability for damages, penalties or charges to the Town.

8. Permits and Approvals:

Permits, Licenses, Approvals and all other legal or administrative prerequisites to its performance of the Contract shall be secured and paid for by the Contractor.

9. Termination and Default:

9.1 Without Cause. The Town may terminate this Contract on seven (7) calendar days notice when in the Town's sole discretion it determines it is in the best interests of the

Town to do so, by providing notice to the Contractor, which shall be in writing and shall be deemed delivered and received when given in person to the Contractor, or when received by fax, express mail, certified mail return receipt requested, regular mail postage prepaid or delivered by any other appropriate method evidencing actual receipt by the Contractor. Upon termination without cause, Contractor will be paid for services rendered to the date of termination.

9.2 For Cause. If the Contractor is determined by the Town to be in default of any term or condition of this Contract, the Town may terminate this Contract on seven (7) days notice by providing notice to the Contractor, which shall be in writing and shall be deemed delivered and received when given in person to the Contractor, or when received by fax, express mail, certified mail return receipt requested, regular mail postage prepaid or delivered by any other appropriate method evidencing actual receipt by the Contractor.

9.3 Default. The following shall constitute events of a default under the Contract:

any material misrepresentation made by the Contractor to the Town; 2) any failure to perform any of its obligations under this Contract including, but not limited to the following: (i) failure to commence performance of this Contract at the time specified in this Contract due to a reason or circumstance within the Contractor's reasonable control, (ii) failure to perform this Contract with sufficient personnel and equipment or with sufficient material to ensure the completion of this Contract within the specified time due to a reason or circumstance within the Contractor's reasonable control, (iii) failure to perform this Contract in a manner reasonably satisfactory to the Town, (iv) failure to promptly re-perform within a reasonable time the services that were rejected by the Town as unsatisfactory, or erroneous, (v) discontinuance of the services for reasons not beyond the Contractor's reasonable control, (vi) failure to comply with a material term of this Contract, including, but not limited to, the provision of insurance and non-discrimination, (vii) any other acts specifically and expressly stated in this Contract as constituting a basis for termination of this Contact, and (viii) failure to comply with any and all requirements of state law and/or regulations, and Town bylaw and/or regulations.

10. Suspension or Delay

The Town may order the Contractor, in writing, to suspend, delay or interrupt all or any part of the Services without cause for such period of time as the Town may determine to be appropriate for its convenience. In the event of any such suspension, delay or interruption, the Contractor's compensation shall be equitably adjusted. No adjustment shall be made if the Contractor is or otherwise would have been responsible for the suspension, delay or interruption of the Services, or if another provision of this Contract is applied to render an equitable adjustment.

11. The Contractor's Breach and the Town's Remedies:

Failure of the Contractor to comply with any of the terms or conditions of this Contract shall be deemed a material breach of this Contract, and the Town of Egremont shall have all the rights and remedies provided in the Contract documents, the right to cancel, terminate, or suspend the

Contract in whole or in part, the right to maintain any and all actions at law or in equity or other proceedings with respect to a breach of this Contract, including "Damages" including but not limited to costs, attorney's fees or other damages resulting form said breach ("Damages") as well as specific performance, and the right to select among the remedies available to it by all of the above.

From any sums due to the Contractor for services, the Town may keep the whole or any part of the amount for expenses, losses and Damages incurred by the Town as a consequence of procuring services as a result of any failure, omission or mistake of the Contractor in providing services as provided in this Contract.

12. Statutory Compliance:

12.1 This Contract will be construed and governed by the provisions of applicable federal, state and local laws and regulations; and wherever any provision of the Contract or Contract documents shall conflict with any provision or requirement of federal, state or local law or regulation, then the provisions of law and regulation shall control. Where applicable to the Contract, the provisions of the General Laws are incorporated by reference into this Contract, including, but not limited to, the following:

General Laws Chapter 30B – Procurement of Goods and Services.

General Laws Chapter 30, Sec. 39, *et seq*: - Public Works Contracts.

General Laws Chapter 149, Section 44A, *et seq*: Public Buildings Contracts.

12.2 Wherever applicable law mandates the inclusion of any term and provision into a municipal contract, this Section shall be understood to import such term or provision into this Contract. To whatever extent any provision of this Contract shall be inconsistent with any law or regulation limiting the power or liability of cities and towns, such law or regulation shall control.

12.3 The Contractor shall comply with all Federal, State and local laws, rules, regulations, policies and orders applicable to the Work provided pursuant to this Contract, such provisions being incorporated herein by reference, and shall be responsible for obtaining all necessary licenses, permits, and approvals required for the supply of such Work.

The Contractor shall indemnify and hold the Town harmless for and against any and all fines, penalties or monetary liabilities incurred by the Town as a result of the failure of the Contractor to comply with the previous sentence. If any discrepancy or inconsistency is discovered in the Drawings, Specifications or Contract for this work in violation of any such law, by-law, regulation, order or decree, it shall forthwith report the same in writing to the Town. It shall, at all times, itself observe and comply with all such existing and future laws, by-laws, regulations, orders and decrees; and shall protect and indemnify the Town, and its duly appointed agents against any claim or liability arising from or based on any

violation whether by him or its agents, employees or subcontractors of any such law, by-law, regulation or decree.

13. Conflict of Interest:

Both the Town and the Contractor acknowledge the provisions of the State Conflict of Interest Law (General Laws Chapter 268A), and this Contract expressly prohibits any activity which shall constitute a violation of that law. The Contractor shall be deemed to have investigated the application of M.G.L. c. 268A to the performance of this Contract; and by executing the Contract documents the Contractor certifies to the Town that neither it nor its agents, employees, or subcontractors are thereby in violation of General Laws Chapter 268A.

14. Certification of Tax Compliance

This Contract must include a certification of tax compliance by the Contractor, as required by General Laws Chapter 62C, Section 49A (Requirement of Tax Compliance by All Contractors Providing Goods, Services, or Real Estate Space to the Commonwealth or Subdivision).

15. Non-Discrimination/Affirmative Action

The Contractor shall carry out the obligations of this Agreement in compliance with all requirements imposed by or pursuant to federal, State and local ordinances, statutes, rules and regulations and policies prohibiting discrimination in employment, including but not limited to, Title VII of the Civil Rights Act of 1964; the Age Discrimination in Employment Act of 1967; Section 504 of the Rehabilitation Act of 1973 and Mass. G. L. c. 151B, and any other executive orders, rules, regulations, requirements and policies relating thereto enacted by the Commonwealth of Massachusetts and the Town as they may be amended from time to time. Contractor shall not discriminate against any qualified employee or applicant for employment because of race, color, national origin, ancestry, ace, sex, religion, physical or mental handicap or sexual orientation.

The following provisions will not apply if the contract price is less than $10,000.00 or where the Contractor employs fewer than six (6) persons. [The Town may, on a case by case basis, determine that the following provisions apply to contracts for less than $10,000.00 or where the Contractor employs less than six (6) employees.]

15.1 As used in this section "affirmative action" means positive steps to ensure all qualified persons equal employment opportunity without regard to race, color, religion, sex or national origin at all stages of the employment process: recruitment, section, placement, promotion, training, layoff and termination. It may include, but is not limited to, the following:

(a) Inclusion in all solicitation and advertisements for employees of a statement that the Contractor is an "Equal Opportunity Employer";
(b) Placement of solicitations and advertisements for employees in media that reaches minority groups;
(c) Notification in writing of all recruitment sources that the Contractor solicits the referral of applicants without regard to race, color, religion, sex or national origin;

(d) Direct solicitation of the support of responsible and appropriate community, state and federal agencies to assist recruitment efforts;
(e)Participation in, or establishment of, apprenticeship or training programs where outside programs are inadequate or unavailable to minority groups;
(f) Modification of collective bargaining agreements to eliminate restrictive barriers established by dual lines of seniority, dual rates of pay or dual lines of promotion or progression which are based on race, color, religion, sex or national origin; and
(g) Review selection, placement, promotion, training, layoff and termination procedures and requirements to ensure that they do not intentionally or unintentionally discriminate against qualified persons because of race, color, religion, sex or national origin.

15.2 The Contractor shall include in all compliance and progress reports submitted to the town a report which shall include: (a) A certificate stating that he or she is currently in compliance with the provisions of G.L. c. 152B and setting forth the Affirmative Action he or she is currently undertaking and will undertake during the contract period to provide equal employment opportunity for all qualified persons without regard to race, color, religion, sex or national origin; and (b) A statement in wiring supporting information signed by an authorized officer or agent on behalf of any labor union or other agency which refers workers or provides or supervises apprenticeship or other training programs which the Contractor deals, to the effect that the union or other agency's practices and policies do not discriminate on the basis of race, color, religion, sex or national origin; provided, in the event that the union or other agency shall refuse to execute such a statement, the Contractor need only so certify in writing.

15.3 A copy of any such report as described above, shall be filed in the office of the Town Clerk and shall upon said filing become a public record.

15.4 The Contractor will take Affirmative Action to ensure that employees are solicited and employed, and that employees are treated during employment, without regard to race, color, religion, sex or national origin.

15.5 The Contractor will in all solicitation 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.

15.6 In determining whether steps taken by the Contractor constitute Affirmative Action, the Town shall take into account the relevant characteristics of the Contractor including, but not limited to, the number of employees and the location of the principal and branch offices.

16. Assignment:

The Contractor shall not assign, sublet or otherwise transfer this Agreement, in whole or in part, without the prior written consent of the Town, and shall not assign any of the moneys payable under this Contract, except by and with the written consent of the Town.

17. Condition of Enforceability Against the Town:

This Contract is only binding upon, and enforceable against, the Town if: (1) the Contract is signed by the Board of Selectmen or its designee; and (2) endorsed with approval by the Town Accountant as to appropriation or availability of funds; and (3) endorsed with approval by the Town Counsel as to form.

18. Corporate Contractor:

If the Contractor is a corporation, it shall endorse upon this Contract (or attach hereto) its Clerk's Certificate certifying the corporate capacity and authority of the party signing this Contract for the corporation. Such certificate shall be accompanied by a letter or other instrument stating that such authority continues in full force and effect as of the date the Contract is executed by the Contractor. This Contract shall not be enforceable against the Town of Egremont unless and until the Contractor complies with this section.

The Contractor, if a foreign corporation, shall file with the Commissioner of Corporations a Power of Attorney and duly authenticated copies of its Charter or Certificate of Incorporation; and said Contractor shall comply with all the laws of the Commonwealth.

19. Contractor's Personnel:

The Contractor shall utilize only its employees and shall not utilize any third-party contractors without prior written approval of the Town.

20. Liability of Public Officials:

To the full extent permitted by law, no official, employee, agent or representative of the Town of Egremont shall be individually or personally liable on any obligation of the Town under this Contract.

21. Indemnification:

The Contractor shall indemnify, defend and save harmless the Town, the Town's officers, agents and employees, from and against any and all damages, liabilities, actions, suits, proceedings, claims, demands, losses, costs, expenses, recoveries and judgments of every nature and description (including attorneys' fees) that may arise in whole or in part out of or in connection with the work being performed or to be performed, or out of any act or omission by the Contractor, its employees, agents, subcontractors, material men, and 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 any party indemnified hereunder. The Contractor further agrees to reimburse the Town for damage to its property caused by the Contractor, its employees, agents, subcontractors or material men, and anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, including damages caused by his, its or their use of faulty, defective, or unsuitable material or equipment, unless the damage is caused by the Town's gross negligence or willful misconduct.

21.1 The Contractor further agrees to indemnify and hold harmless the Town, including the agents, employees and representatives of either, from and against all claims, damages, losses and expenses, including attorney's fees, arising out of or resulting from the performance of the work, provided that any such claim, damage, loss or expense (a) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property including the loss of use resulting therefrom and (b) is caused in whole or in part by any negligent act or omission of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.

21.2 The Contractor shall be responsible for all damage or injury to property of any character during the prosecution of the work resulting from any act, omission, neglect, or misconduct in the manner or method of executing the work or due to the non-execution of the work or at any time due to defective work or materials.

21.3 In any and all claims against the town or any of their agents or employees by any employee of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under this paragraph shall not be limited in anyway by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any Subcontractor under workmen's Compensation Acts, disability benefit acts or other employee benefit acts.

21.4 The Contractor hereby assumes the entire responsibility and liability for any and all injury to or death of any or all persons, including the Contractor's employees, and for any and all damage to property caused by, resulting from or arising in whole or in part out of any act, omission, or neglect on the part of the Contractor or of any Subcontractor or of anyone directly or indirectly employed by any of them, or of anyone for whose acts any of them may be liable in connection with operations under the Contract.

The foregoing provisions shall not be deemed to be released, waived, limit or modified in any respect by reason of any surety or insurance provided by the Contractor under the Contract.

22. Insurance

22.1 Workers Compensation Insurance:

The Contractor shall provide Workers Compensation Insurance in the amount of $1,000,000.00/$1,000,000.00/$1,000,000.00 to all employees of the Contractor who are subject to the provisions of Chapter 152 of the General Laws of Massachusetts.

Failure to provide and continue in force such insurance during the period of this Contract shall be deemed a material breach of this Contract, shall operate as an immediate termination thereof, and Contractor shall indemnify the Town for all losses, claims, and actions resulting from the failure to provide the insurance required by this Article.

The Contractor shall furnish to the Town a certificate evidencing such insurance prior to the execution of this Contract before the same shall be binding on the parties thereto, except if specifically waived by the Town.

22.2 Professional Liability Insurance

Liability of $1 million per claim and $3 million aggregate.

Failure to provide and continue in force such insurance during the period of this Contract shall be deemed a material breach of this Contract, shall operate as an immediate termination thereof, and Contractor shall indemnify the Town for all losses, claims, and actions resulting from the failure to provide the insurance required by this Article.

22.3 Other Insurance Requirements

a. Comprehensive commercial general liability insurance with limits of at least $1 Million per occurrence and $3 Million annual aggregate for property damage and $1 Million per person and $3 Million per occurrence for bodily injury, which shall include the Town of Egremont as an additional insured, and which shall cover bodily injury, sickness or disease, or death of any person including employees and those persons other than the Contractor's employees, and claims insured by usual personal liability coverage, death, or property damage arising out of the Work including injury or destruction of tangible property, including loss of use resulting therefrom.

b. Motor vehicle insurance for any motor vehicles used in performing the Work, with limits of at least $500,000 per person, and $1 Million per accident.

c. The intent of the Specifications regarding insurance is to specify minimum coverage and minimum limits of liability acceptable under the Contract. However, it shall be the Contractor's responsibility to purchase and maintain insurance of such character and in such amounts as will adequately protect it and the Town from and against all claims, damages, losses and expenses resulting from exposure to any casualty liability in the performance of the work, including and not limited to Professional liability insurance where applicable.

d. All policies shall identify the Town as an additional insured (except Workers' Compensation). The Contractor shall notify the Town immediately upon the cancellation or amendment to any policy. Renewal Certificates shall be filed with the Town at least ten (10) days prior to the expiration of the required policies. Certificates evidencing all such coverage shall be provided to the Town upon the execution of this Agreement, and upon the renewal of any such coverage. Each such certificate shall specifically refer to this Contract and shall state that such

insurance is as required by this Contract. **Failure to provide the notices required in this Section or to continue in force such insurance shall be deemed a material breach of this Contract and shall be grounds for immediate termination**. Said insurance shall include: Workers Compensation/Employers' Liability Insurance, Business Automobile Liability Insurance, and Commercial General Liability Insurance (CGL). The CGL policy shall include coverage for liability arising from premises, operations, independent Contractors, personal injury, contractual liability. All Certificates of Insurance shall be on the "MIIA" or "ACORD" Certificate of Insurance form, shall contain true transcripts from the policies, authenticated by the proper officer of the Insurer, evidencing in particular those insured, the extent of coverage, the location and operations to which the insurance applies, the expiration date and the above-mentioned notice clauses. All insurance shall be written on an occurrence basis. Coverage's shall be maintained without interruption from date of the Contract until date of final payment and termination of any coverage required to be maintained after payment.

e. The Contractor shall obtain and maintain during the term of this Contract the insurance coverage in companies licensed to do business in the Commonwealth of Massachusetts and acceptable to the Town.

23. Documents, Materials, Etc.

Any materials, reports, information, data, etc. given to or prepared or assembled by the Contractor under this Contract are to be kept confidential and shall not be made available to any individual or organization by the Contractor (except agents, servants, or employees of the Contractor) without the prior written approval of the Town, except as otherwise required by law. The Contractor shall comply with the provisions Chapter 66A of the General Laws of Massachusetts as it relates to public documents, and all other state and federal laws and regulations relating to confidentiality, security, privacy and use of confidential data.

Any materials produced in whole or in part under this Contract shall not be subject to copyright, except by the Town, in the United States or any other country. The Town shall have unrestricted authority to, without payment of any royalty, commission, or additional fee of any type or nature, publicly disclose, reproduce, distribute and otherwise use, and authorize others to use, in whole or in part, any reports, data or other materials prepared under this Contract.

All data, reports, programs, software, equipment, furnishings, and any other documentation or product paid for by the Town shall vest in the Town at the termination of this Contract. The Contractor shall at all times, during or after termination of this Contract, obtain the prior written approval of the Town before making any statement bearing on the work performed or data collected under this Contract to the press or issues any material for publication through any medium.

24. No Employment

The Contractor acknowledges and agrees that it is acting as an independent Contractor for all

services rendered pursuant to this Contract, and neither the Contractor, nor its employees, agents, servants nor any person for whose conduct the Contractor is responsible shall be considered an employee or agent of the Town for any purpose and shall not file any claim or bring any action for any worker's compensation unemployment benefits and compensation for which they may otherwise be eligible as a Town employee as a result of work performed pursuant to the terms of this Contract.

25. Audit, Inspection and Recordkeeping

At any time during normal business hours, and as often as the Town may deem it reasonably necessary, there shall be available in the office of the Contractor for the purpose of audit, examination, and/or to make excerpts or transcript all records, contracts, invoices, materials, payrolls, records of personnel, conditions of employment and other data relating to all matters covered by this Agreement.

26. Payment

The Town agrees to make all reasonable efforts to pay to the Contractor the sum set forth in the Contractor's bid or proposal within thirty (30) days of receipt of an invoice detailing the work completed and acceptance from the Town of the work completed.

27. Waiver and Amendment

Amendments, or waivers of any additional term, condition, covenant, duty or obligation contained in this Contract may be made only by written amendment executed by all signatories to the original Agreement, prior to the effective date of the amendment.

To the extent allowed by law, any conditions, duties, and obligations contained in this Contract may be waived only by written Agreement by both parties.

Forbearance or indulgence in any form or manner by a party shall not be construed as a waiver, nor in any manner limit the legal or equitable remedies available to that party. No waiver by either party of any default or breach shall constitute a waiver of any subsequent default or breach of a similar or different matter.

28. Severability

If any term or condition of this Contract or any application thereof shall to any extent be held invalid, illegal or unenforceable by the court of competent jurisdiction, the validity, legality, and enforceability of the remaining terms and conditions of this Contract shall not be deemed affected thereby unless one or both parties would be substantially or materially prejudiced.

29. Forum and Choice of Law

This Contract and any performance herein shall be governed by and be construed in accordance with the laws of the Commonwealth. Any and all proceedings or actions relating to subject matter herein shall be brought and maintained in the courts of the Commonwealth or the federal

district court sitting in the Commonwealth, which shall have exclusive jurisdiction thereof. This paragraph shall not be construed to limit any other legal rights of the parties.

30. Notices

Any notice permitted or required under the provisions of this Contract to be given or served by either of the parties hereto upon the other party hereto shall be in writing and signed in the name or on the behalf of the party giving or serving the same. Notice shall be deemed to have been received at the time of actual service or three (3) business days after the date of a certified or registered mailing properly addressed. Notice to the Contractor shall be deemed sufficient if sent to the address set forth on page 1 or furnished from time to time in writing hereafter.

31. Binding on Successors:

This Contract is binding upon the parties hereto, their successors, assigns and legal representatives (and where not corporate, the heirs and estate of the Contractor). Neither the Town nor the Contractor shall assign or transfer any interest in the Contract without the written consent of the other.

32. Entire Agreement:

This Contract, including all documents incorporated herein by reference, constitutes the entire integrated agreement between the parties with respect to the matters described. This Contract supersedes all prior agreements, negotiations and representations, either written or oral, and it shall not be modified or amended except by a written document executed by the parties hereto.

IN WITNESS WHEREOF the parties have hereto and to two other identical instruments set forth their hands and executed this as an instrument under seal this the day and year first above written.

The Town of Egremont
By the Board of Selectmen

_____
Signature Date

_____
Signature Date

_____
Signature Date

The Contractor by:

_____
Signature Date

_____
Print Name & Title

Certified as to Form:

_____
Town Counsel Date

Certified as to
Appropriation/Availability of Funds:

_____
Town Accountant Date

CERTIFICATION OF GOOD FAITH

The undersigned certifies under pains and penalties of perjury that this contract has been obtained 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.

The Contractor by: _____
Print Name

_____
Title/Authority

CERTIFICATE OF STATE TAX COMPLIANCE

Pursuant to Massachusetts General Laws, Chapter 62C, Section 49A

_____, authorized signatory for
name of signatory
_____, whose
name of contractor
principal place of business is at _____,

_____does hereby certify under the pains and penalties of perjury

that _____ has paid all
name of contractor
Massachusetts taxes and has complied with all laws of the Commonwealth of Massachusetts relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

_____
Signature Date

ATTACHMENT C
GENERAL TERMS AND CONDITIONS

TOWN OF EGREMONT
STANDARD CONSTRUCTION CONTRACT

GENERAL CONDITIONS OF THE CONTRACT

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Appendix A -- Statutory Provisions Incorporated by reference
Appendix B -- Commonly-Used Forms

1.0 GENERAL PROVISIONS

1.1 Scope of the Work. The Work comprises the completed project described in the Contract Documents and includes all labor, professional services, transportation, tools, materials, supplies, equipment, permits, approvals, documents, calculations, submittals, and certificates necessary to develop, perform, construct and complete the project in accordance with all applicable laws, ordinances, and regulations, and in accordance with the Contract Documents.

1.2 Interpretation. 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 part of the Work to be performed by the Contractor. Capitalized terms not otherwise defined herein shall have the meanings assigned to them in the Owner-Contractor Agreement.

1.3 Administrator. The term "Administrator" means the person appointed by the Awarding Authority to administer this Contract. The Contractor shall address mail to the Administrator c/o the Awarding Authority.

1.4 Written Authorization. Actions taken, and approvals and decisions made by the Awarding Authority under this Contract require the prior approval and signature of the Administrator. These include, but are not limited to, the following: changes in the Contract Price, time for completion, or any other provision of this Contract; written orders, notices, and approvals given by the Awarding Authority pursuant to the Contract Documents or pursuant to any laws applicable to this Contract, including approval of "or equal" submissions; issuance of stop work orders; approval of Contractor's applications for payment; and termination of the Contract. Work undertaken by the Contractor not authorized by the Administrator's signature prior to the start of such work shall be considered unauthorized work and shall not entitle the Contractor to any extra payment. The Contractor shall perform, at its own expense, corrective measures required by the Awarding Authority due to any failure to obtain the prior approval of the Administrator for any item of work.

1.3 Contractor's General Duties. The Contractor shall perform the Work in a competent manner in accordance with the Contract Documents and all applicable laws. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures, and coordination of all portions of the Work under this Contract. The Contractor shall provide and perform for the Contract Price all of the duties and obligations set forth in the Contract Documents. 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 legal requirements, the Contractor shall promptly notify the Awarding Authority of that fact in writing. If the Contractor performs Work knowing it to be contrary to legal requirements, the Contractor shall be liable for all damages caused thereby, including the cost of correcting the Work.

1.4 Sales Tax Exemption and Other Taxes. To the extent that materials and supplies are used or incorporated in the performance of this Contract, the Contractor is considered an exempt purchaser under the Massachusetts Sales Act, Chapter 14 of

the Acts of 1966. The Contractor shall pay all taxes and tariffs of any sort related to the Work, subject to the applicable exemptions.

1.5 Permits, Fees and Notices. The Contractor shall secure and pay for all permits and governmental fees, licenses, and inspections necessary for proper execution and completion of the Work. The Contractor shall coordinate all efforts required to obtain these permits unless otherwise directed in writing by the Awarding Authority. The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations, codes, and lawful orders of public authorities bearing on the performance of the Work.

1.6 Safety Requirements. The Contractor shall comply with all Federal, State, and local safety laws and regulations applicable to the Work.

1.7 Minimum Wage Rates. The Contractor shall comply with M.G.L. c. 149, §§26-27H. The wage schedule found in Exhibit A to the Instructions to Bidders lists the minimum wage rates that must be paid to all workers employed in the Work throughout the term of this Contract, subject to the exceptions provided in M.G.L c.149, §§ 26-27H.. The Awarding Authority is not responsible for any errors, omissions, or misprints in the said schedule. The Contractor shall not have any claim for extra compensation from the Awarding Authority arising from the fact that the actual wages paid to workers employed in the Work exceed the rates listed on the schedule or as otherwise provided by law. The Contractor shall cause a copy of the schedule to be posted 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, §34B).

1.8 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.

1.9 Safety Requirements; OSHA Training[M.G.L. c. 30, s. 39S]. The Contractor shall comply and shall cause all subcontractors and persons employed on the Work to comply with all applicable safety requirements. By executing this contract the Contractor hereby certifies that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and that all employees to be employed in the work subject to this bid 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. Any employee found on a worksite subject to this section without documentation of successful completion of 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 shall be subject to immediate removal.

1.10 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 six years from the date of completion of the Contract. Such records shall be open to inspection by any authorized representative of the Awarding Authority or 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 Executive Department of Labor within fifteen days after completion of its portion of the Work a signed statement in the form required by the Awarding Authority.

1.11 Workforce Qualifications. The Contractor shall: (i) employ competent workers; (ii) enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work; (iii)not permit employment of unfit persons or persons not skilled in tasks assigned to them. Whenever the Administrator shall notify the Contractor in writing that any worker is, in the Administrator's opinion, incompetent, unfaithful, disorderly, or otherwise unsatisfactory, such employee shall be discharged from the Work and shall not again be employed on the Work except with the consent of the Administrator.

1.12 Affirmative Action, Non-Discrimination in Hiring and Employment. Pursuant to Executive Order #478, by signing this Contract the Contractor hereby certifies under the pains and penalties of perjury that the Contractor currently complies with and will continue to comply with all federal and state laws, rules and regulations promoting fair employment practices or prohibiting employment discrimination and unfair labor practices and shall not discriminate in the hiring of any applicant for employment nor shall any qualified employee be demoted, discharged or otherwise subject to discrimination in the tenure, position, promotional opportunities, wages, benefits or terms and conditions of their employment because of race, color, national origin, ancestry, age, sex, religion, disability, handicap, sexual orientation or for exercising any rights afforded by law. Pursuant to Executive Order #390, the Contractor commits to purchasing supplies and services from certified minority or women-owned businesses, small businesses or businesses owned by socially or economically disadvantaged persons or persons with disabilities.

1.13 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, within such preference, preference shall be given to service-disabled veterans; and secondly, to citizens of the Commonwealth generally who have been residents of the Commonwealth for at least six months at the commencement of their employment, and if they cannot be obtained in sufficient numbers, then to citizens of the United States.

1.14 Employment Eligibility Verification Requirements [8 U.S.C., ss. 1324a,1324b; M.G.L. c. 149, s. 19C; Executive Order No. 481]. The Contractor hereby certifies under pains and penalties of perjury as a condition of receiving this Contract, that it shall not knowingly use undocumented workers in connection with the performance of the Work and that, pursuant to the requirements of federal law,

the Contractor shall verify the immigration status of all workers employed in connection with the Work without engaging in unlawful discrimination, and that Contractor shall not knowingly or recklessly alter, falsify, or knowingly or recklessly accept altered or falsified documents of any worker. The Contractor shall cause all subcontractors to comply with this provision. The Contractor shall comply with Federal Department of Homeland Security Requirements in hiring any and all "employees" to be employed on the Work who are required to be listed in the certified payroll reports for the Work. Without limitation, such requirements shall include the good faith completion of the Federal Department of Homeland Security 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) simultaneously with the execution of this Contract. The contractor shall require each of its subcontractors and sub subcontractors to execute and provide to the Contractor an I-9 Certificate with the execution of each subcontract, and the Contractor shall immediately provide a copy to the Awarding Authority. The Contractor shall certify in each certified payroll report submitted to the Awarding Authority that the Form I-9 process was faithfully completed for all employees listed on the payroll report. Violation of this Section shall constitute a material breach of this Contract, subjecting the Contractor to sanctions including but not limited to monetary penalties, withholding of payments, contract suspension, or termination.

1.15 Weekly or Biweekly wage payments [M.G.L. c. 149, s. 148] 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.

1.16 Anti-Boycott Covenant [Executive Order #130]. The Contractor warrants that during the time this Contract is in effect, neither it or any affiliated company, as hereafter defined, participates in or cooperates with an international boycott, as defined in Section 999(b) (3) and (4) of the Internal Revenue Code of 1954, as amended, or engages in conduct declared to be unlawful by M.G.L. c. 151E, s. 2. If there shall be a breach in the warranty, representation or agreement contained in this paragraph, then without limiting such other rights as it may have the Awarding Authority shall be entitled to rescind this contract. As used herein, an affiliated company shall be any business entity of which at least 51% of the ownership interests are directly or indirectly owned by the Contractor or by a person or persons or business entity or entities directly or indirectly owning at least 51% of the Ownership interests of the Contractor; or which directly or indirectly owns at least 51% of the Ownership interests of the Contractor.

1.17 Labor Harmony [M.G.L. c. 30, s. 39S]. By executing this contract the Contractor hereby certifies that (1) that Contractor is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work. 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

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.

1.18 Risk of Loss. The Contractor shall bear the risk of loss with respect to any of its or its agents', employees' or subcontractors' vehicles, equipment or tools brought onto or left at the worksite and for any materials stored at the worksite.

1.19 Northern Ireland Certification [M.G.L. c. 7, s. 22C]. The Contractor certifies that it does not employ ten or more employees in an office or other facility in Northern Ireland and if the Contractor employs ten or more employees in an office or other facility located in Northern Ireland the Contractor certifies that it does not discriminate in employment, compensation, or the terms, conditions and privileges of employment on account of religious or political belief; and it promotes religious tolerance within the work place, and the eradication of any manifestations of religious and other illegal discrimination; and the Contractor is not engaged in the manufacture, distribution or sale of firearms, munitions, including rubber or plastic bullets, tear gas, armored vehicles or military aircraft for use or deployment in any activity in Northern Ireland.

1.20 Energy Efficiency. The Contractor commits to meet the minimum energy performance standards required pursuant to Executive Order # 484. If the Contract is for a project over 20,000 square feet, it must meet the Mass. LEED Plus building standard including: 1) certification by the U.S. Green Building Council Leadership in Energy and Environmental Design (LEED) program; 2) energy performance 20% better than the Massachusetts Energy Code; 3) independent 3rd party commissioning; 4) reduction of outdoor water consumption by 50% and indoor water consumption by 20% relative to standard baseline projections; and 5) conformance with at least 1 of 4 identified smart growth criteria.

If the Contract is for a project under 20,000 square feet, it must meet the minimum energy performance standards established by the Commonwealth of Massachusetts Sustainable Design Roundtable.

2.0 MATERIALS AND EQUIPMENT WARRANTY

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 inform itself as to, and shall comply with, the provisions of M.G.L. c. 7, s. 23A, as amended, and shall abide by the same and all applicable rules, regulations and orders made thereunder in relation to the purchase of supplies and materials in the execution of the Work, including the provisions of M.G.L. c.7, s. 22, paragraph 17 which provides that there be *"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."*

3.0 PROSECUTION OF THE WORK -- LIQUIDATED DAMAGES

3.1. Beginning, Progress Schedule. The Contract time shall commence upon the date specified in the Notice to Proceed executed by the Administrator and delivered to the Contractor after the execution of this Contract. The Contractor shall begin Work at the Site within ten days of said date unless otherwise ordered in writing by the Awarding Authority. Prior to commencing the Work, the Contractor shall meet with representatives of the Awarding Authority to discuss the quality assurance program, safety program, labor provisions, progress schedule, schedule of values, and other Contract procedures. Upon Approval by the Administrator, the progress schedule shall constitute the progress schedule for the Work. Upon approval by the Administrator, the schedule of values shall be the basis for payment for the Work. The Contractor shall at the end of each month, or more often if required, furnish 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 approved progress schedule.

3.2 Time for Completion of Work. 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 subject only to extensions specifically permitted in accordance with the terms of this Contract.

3.3 Definition of "Substantial Completion." For the purposes of this Contract the term "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 the purposes of the preceding sentences the term "substantially completes" means that the work required by the Contract has been completed except for minor incomplete or unsatisfactory work items that do not materially impair the usefulness of the Work.

3. 4 Failure to Complete Work on Time - Liquidated Damages.
The Awarding Authority has determined that its damages as a result of Contractor's failure to complete the Work to Substantial Completion within the Contract time will be difficult or impracticable to ascertain. Accordingly, 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 Substantial Completion. Such moneys shall be paid as liquidated damages, and not as a penalty, to cover losses and expenses to the Awarding Authority resulting solely from the fact that the Work is not completed on time. 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.

3.5 Collection of Liquidated Damages. The Awarding Authority may recover 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.

3.6 Awarding Authority's Approvals and Interpretations. Decisions by the Awarding Authority regarding interpretation of the specifications, approval of equipment, material or any other approval, or progress of the Work, shall be made promptly and, in any event, no later than thirty days after the Contractor's written submission for decision; but if such decision requires extended investigation and study, the Awarding Authority shall, within thirty days after the receipt of the submission, give the Contractor 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.

3.7 Extension for Delays Caused by Awarding Authority. The only circumstances under which the Contract Price shall be increased due to delays caused by the Awarding Authority are those specified in M.G.L. c. 30, §390 appearing in Appendix A to these General Conditions of the Contract. In all other cases the Contractor shall be entitled neither to increase the Contract Price nor to receive damages on account of any hindrances or delays, avoidable or unavoidable, but if the delay is caused by the Awarding Authority, the Contractor shall be entitled to an extension of time to the extent provided in M.G.L. c. 30, §390. The Contractor must submit any claim under this paragraph to the Awarding Authority in writing as soon as practicable after the end of the Awarding Authority's suspension, delay, interruption or failure to act and, in any event, not later than the date of final payment under this Contract. Except for costs due to a suspension order, the Awarding Authority shall not approve any costs in the claim incurred more than 20 days before the Contractor notified the Awarding Authority in writing of the act or failure to act or the Awarding Authority that gave rise to the claim.

3.8 Awarding Authority's Right to Reject Defective Materials and Work. Except as otherwise provided herein, the Awarding Authority's inspection of the Work shall not relieve the Contractor of any of its responsibilities hereunder, and defective work shall be corrected. The Awarding Authority may reject unsuitable work, notwithstanding that such work and materials have been previously accepted for payment. If any part of the Work shall be found defective at any time before the final acceptance of the whole Work, the Contractor shall promptly correct such defect in a manner satisfactory to the Awarding Authority. If any material brought upon the site for use in the Work shall be rejected by the Awarding Authority as not in conformity with the Contract Documents, the Contractor shall promptly remove such materials from the site.

3.9 Substantial Completion of the Work; Final Completion; Awarding Authority's Remedies. When the Work has reached the point of Substantial Completion as shown on Approved payment request, the Contractor shall assist the Awarding Authority in the development of a punch list identifying those items of unfinished or unacceptable Work that remain to be performed or corrected under the Contract. The Contractor shall complete the lunch list items to final completion within 30 days after the Awarding Authority's approval of the punch list. At any time after the value of the Work remaining to be done is, in the estimation of the Awarding Authority, less than 1 per cent of the adjusted Contract price, or the

Awarding Authority has determined that the Contractor has substantially completed the work and the Awarding Authority has taken possession for occupancy, the Awarding Authority may send to the Contractor by certified mail, return receipt requested, a complete and final list of all incomplete and unsatisfactory work items, including, for each item on the list, a good faith estimate of the fair and reasonable cost of completing such item. The Contractor shall then complete all such work items within 30 days of receipt of such list or before the Contract completion date, whichever is later. If the Contractor fails to complete all incomplete and unsatisfactory work items within 45 days after receipt of such items furnished by the Awarding Authority or before the Contract completion date, whichever is later, subsequent to an additional 14 days' written notice to the Contractor by certified mail, return receipt requested, the Awarding Authority may terminate this Contract and complete the incomplete and unsatisfactory work items and charge the cost of same to the Contractor and such termination shall be without prejudice to any other rights or remedies the Awarding Authority may have under this Contract.

4.0 CHANGES IN THE WORK

4.1 Changes within the Scope of the Work. 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 Awarding Authority-furnished facilities, equipment, materials, services, or Site; or (4) the schedule for performance of the Work. The Contractor shall immediately perform any change order work that is ordered in writing by the Awarding Authority.

4.2. Request for Equitable Adjustment due to Change Order. Whenever a change order is issued by the Awarding Authority that will cause a change in the Contractor's cost or time for performance, the Contractor or the Awarding Authority may request an equitable adjustment in the Contract Price or the Contract time. A request for such an adjustment shall be in writing and shall be submitted by the party making such claim to the other party.

4.3. Latent Conditions. 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 indicated in the Contract Documents, then either the Contractor or the Awarding Authority may request an equitable adjustment in the Contract Price in accordance with M.G.L. c.30, §39N appearing in Appendix A attached to these General Conditions of the Contract. Likewise if the latent or subsurface physical condition causes a change in the time for performing the Work, either the Contractor or the Awarding Authority may request an equitable adjustment of the time for the performance of the Work.

4.4 Computation of Equitable Adjustments. 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 (said 20% allowance shall be paid to the Contractor and the Contractor and said subcontractors shall agree upon the distribution of this amount as a matter of contract between them)., (d) plus (or minus) the actual direct additional premium costs and expenses incurred as a result of collective bargaining agreements or other agreements between organized labor and employers, and plus (or minus) (e) the actual direct premium cost of payment and performance bonds required of Contractor and filed Subcontractors for this Contract. 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.

4.4 Appeal Procedure. If the Contractor disputes a change, an equitable adjustment, or a Contract interpretation by the Awarding Authority, the Contractor shall follow the procedures set forth in M.G.L. c. 30, §39Q appearing in Appendix A to these General Conditions of the Contract.

5.0 PAYMENT PROVISIONS

5.1 Applications for Periodic Payments. Once each month, on a date established at the beginning of the Work, the Contractor shall deliver to the Awarding Authority an itemized Application for Payment, supported by such data substantiating the Contractor's right to payment as the Awarding Authority may require. The application shall reflect a minimum of 5% retainage and shall be subject to, and processed in accordance with, the provisions of M.G.L. c. 30, §39K appearing in Appendix A to these General Conditions. 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.

5.2 Deductions by the Awarding Authority. The Awarding Authority may deduct from any application for a periodic payment submitted by the Contractor a retention based upon the value of its claims against the Contractor plus a retention of 5% of the approved amount of the Application for Payment and any other amounts authorized by M.G.L. c. 30, §39K.

5.3 Final Payment. Final Payment under this Contract shall be processed in accordance with the procedures set forth in M.G.L. c. 30, §39K. The acceptance by the Contractor of the last payment due under this Contract or the Contractor's execution of the Final Certificate of Completion, shall operate as a release to the Awarding Authority from all claims and liability related to this Contract.

6.0 WARRANTIES AND GUARANTEE

6.1 Warranty. The Contractor warrants to the Awarding Authority that materials and equipment furnished under the Contract will be of good quality and new unless otherwise required or permitted by the Contract Documents, that the Work will be free from defects not inherent in the quality required or permitted, and that the Work will conform with the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective.

6.2 General Guaranty. If at any time during the period of one (1) year from the date of the its substantial completion, as shown on an approved payment request, the Work or any part of the Work shall in the reasonable determination of the Awarding Authority require replacing or repairing due to the fact that it is broken, defective, or otherwise does not conform to the Contract Documents, the Awarding Authority will notify the Contractor to make the required repairs or replacement. If the Contractor shall neglect to commence such repairs or replacements to the satisfaction of the Awarding Authority within ten (10) days from the date of giving or mailing such notice, then the Awarding Authority may employ other persons to make said repairs or replacements. The Contractor agrees, upon demand, to pay to the Awarding Authority all amounts which the Awarding Authority expends for such repairs or replacements. For items of work completed after substantial completion, the one-year guarantee shall commence at the time the Awarding Authority approves of the completion of such items. This one-year guarantee shall not limit any express guaranty or warranty required to be assigned to the Awarding Authority pursuant to the terms of the Plans and Specifications.

7.0 INSURANCE REQUIREMENTS

7.1 Insurance Generally.

A. The Contractor shall purchase and maintain insurance of the type and limits 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 lawfully authorized to write that type of insurance under the laws of the Commonwealth with a financial strength rating of "A-" or better as assigned by AM Best Company, or an equivalent rating assigned by a similar rating agency acceptable to the Awarding Authority, 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 each type of insurance, insurance company, policy number, amount of insurance, deductibles and/or self-insured retentions, and policy effective and expiration dates. Certificates shall show the Awarding Authority and the Owner and anyone else the Awarding Authority requests as an additional insured as to all policies of liability insurance. Certificates shall specifically note the following:

- that the General Liability policy includes contractual liability
- that the General Liability policy includes the Owner and Awarding Authority as additional insureds for ongoing operations (CG 20 10) and for completed operations (CG 37 10) or equivalent endorsements.
- that the automobile liability, umbrella liability and pollution liability policies include the Owner and Awarding Authority as additional insureds
- that the General Liability policy includes endorsement CG 24 04 or equivalent, a Waiver of Subrogation in favor of the Owner and Awarding Authority
- that the Builders' Risk or Installation Floater is on an all risk basis including earthquake and flood, and includes the Owner and Awarding Authority, contractor, subcontractors and suppliers of any tier as named insureds or loss payees as their interests may appear.
- 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.

D. The Contractor shall file one certified complete copy of all policies and endorsements 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.

F. The Contractor is responsible for the payment of any and all deductibles under all of the insurance required below. Neither the Owner nor the Awarding Authority shall in any instance be responsible for the payment of deductibles, self-insured retentions, or any portion thereof.

7.2 <u>Contractor's Commercial General Liability.</u>

A. The Contractor shall purchase and maintain general liability coverage on the ISO form CG 00 01 or equivalent, including products and completed operations, on an occurrence basis. The form must be amended to state that the aggregate limit applies on a per location/project basis. The policy shall provide the following minimum coverage to protect the Contractor from claims with respect to the operations performed by Contractor and any employee, subcontractor, or supplier, or by anyone for whose acts they may be liable 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	$2,000,000 general aggregate, 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 and acceptance by the Awarding Authority. The Contractor shall provide renewal certificates of insurance to the Awarding Authority as evidence that this coverage is being maintained.

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 the Owner and Awarding Authority and anyone else requested by the Awarding Authority as additional insureds via endorsements CG 20 10 for ongoing operations and CG 20 37 for completed operations This policy shall be primary and non-contributory with respect to any other insurance available to additional insureds.

G. The policy shall include endorsement CG 24 04, a Waiver of Subrogation in favor of the Awarding Authority and Owner.

7.3 <u>Automobile Liability.</u>

A. The Contractor shall purchase and maintain the following minimum coverage with respect to the operations of any owned, non-owned, and hired vehicles including trailers used in the performance of the work, 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 & Property Damage $1,000,000 combined single limit

B. The policy shall include a CA 99 48 Broadened Pollution Endorsement. If specified in Exhibit A. to the Owner – Contractor Agreement, the Contractor, if hauling contaminants and/or pollutants, must adhere to Sections 29 and 30 of the Motor Carrier Act of 1980, which shall include coverage Form MCS-90.

C. The policy shall name the Owner and Awarding Authority as Additional Insureds.

D. The policy shall contain a Waiver of Subrogation in favor of the Awarding Authority and Owner.

7.4 <u>Worker's Compensation.</u>

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 A to the Owner - Contractor Agreement, in which case the Contractor shall provide the higher coverage:

Worker's Compensation	Statutory limits
Employer's Liability	$ 500,000 each accident
	$ 500,000 disease per employee
	$ 500,000 disease policy aggregate

B. The policy shall contain a Waiver of Subrogation in favor of the Owner and the Awarding Authority.

7.5 <u>Umbrella Coverage.</u>

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:

Limit of liability: $3,000,000 per occurrence

7.6 <u>Additional types of Insurance.</u>

The Contractor shall provide such other types of insurance as may be required by Exhibit A to the Owner - Contractor Agreement.

8.0 INDEMNIFICATION

The Contractor shall indemnify, defend (with counsel subject to the supervision of the Attorney General of the Commonwealth of Massachusetts as required by M.G.L. c. 12, §3) and hold harmless the Awarding Authority and the Commonwealth 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 8.

9.0 BONDS

The Contractor shall provide the Awarding Authority with a Performance Bond and a Payment or Labor and Materials Bond in the form provided by the Awarding Authority, executed by a surety company licensed by the Commonwealth of Massachusetts' Division of Insurance and whose name appears on United States Treasury Department Circular 570. Both the Performance Bond and the Payment Bonds shall be in an amount equal to the Contract Sum unless, with respect to the Payment Bond or Labor and Materials Bond a lesser amount of no less than one half the contract price is expressly specified in the Advertisement or Instructions to Bidders, or with respect to the Performance Bond no such bond is required as expressly set forth in the Advertisement or Instructions to Bidders.

10.0 TERMINATION

10.1 Termination for Cause.

The Awarding Authority may terminate this Contract for cause if it determines that any of the following circumstances have occurred:

-- the Contractor is adjudged bankrupt or has made a general assignment for the benefit of its creditors;

-- a receiver has been appointed of the Contractor's property;

-- all or a part of the Work has been abandoned;

-- 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 Awarding Authority, except as provided in the Contract Documents;

-- the Awarding Authority has determined that the rate of progress required on the project is not being met;

-- the Contractor has substantially violated any provisions of this Contract.

The Awarding Authority may complete the Work or any part thereof, and charge its expense of so completing the work or part thereof, to the Contractor. The Awarding Authority may take possession of and use any materials, machinery, implements and

tools found upon the site of said Work. The Awarding Authority 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 Project site after the Awarding Authority has no further use for them.

10.2 Termination for Convenience.

(a) In the event that this Contract is terminated by the Awarding Authority prior to the completion of construction and termination is not based on a reason listed in Paragraph 10.1, the Contractor shall be compensated for its costs incurred, including reasonable costs of de-mobilization, calculated on a percent completion basis covering the period of time between the last Approved application for payment and the date of termination.

(b) Payment by the Awarding Authority pursuant to Subparagraph 10.2(a) shall be deemed to fully compensate the Contractor for all claims and expenses directly or indirectly attributable to the termination, including any claims for lost profits.

11. NON-APPROPRIATION

The Commonwealth certifies that at the time of the execution of this Contract, sufficient appropriations exist and shall be encumbered to fund the Contract Price. Payments are subject to appropriation and shall be made only for work performed in accordance with the terms of this Contract. The Contractor shall not be obligated to perform, and may not perform, work outside the duration and scope of this Contract without an appropriate amendment to this Contract, and a sufficient appropriation(s) to support such additional work. The Commonwealth may immediately terminate or suspend this Contract in the event that the appropriation(s) funding this Contract is eliminated or reduced to an amount which will be insufficient to support anticipated future obligations under this Contract.

12. RECORDS AND LAWS

The Contractor shall make, and keep for at least six years after final payment, books, records, and accounts, which in reasonable detail accurately and fairly reflect the transactions and dispositions of the Contractor. [M.G.L. c. 30, §39R(b)(1)-(2)].

Until the expiration of six years after final payment, the Office of the Inspector General, and the Commissioner of DCAM shall have the right to examine any books, documents, papers or records of the Contractor or of its subcontractors that directly pertain to, and involve transactions relating to, the Contractor or its subcontractors. [M.G.L. c. 30, §39R(b)(1)-(2)]. If this is a materials contract with a contract price of over $100,000 the contractor shall also comply with M.G.L. c. 30, §39R(c). Furthermore, pursuant to Executive Order #195, the Governor or his designee, the secretary of administration and finance, and the state auditor or his designee shall have the right at reasonable times and upon reasonable notice to examine the books, records and other compilations of data or the Contractor which pertain to the performance and requirements of this Contract.

13. CHOICE OF LAW

This Contract shall be construed under and governed by the laws of the Commonwealth of Massachusetts. The Contractor, and the agents thereof, agree to

bring any federal or state legal proceedings arising under this Contract, in which either the Commonwealth or the Awarding Authority is a party, in a court of competent jurisdiction within the Commonwealth of Massachusetts. This section shall not be construed to limit any rights a party may have to intervene in any action, in any court or wherever, pending, in which the other is a party.

14. STATUTORY PROVISIONS INCORPORATED BY REFERENCE

The statutory provisions appearing in Appendix A attached hereto are incorporated into this Contract by reference.

APPENDIX A
Statutory Provisions Incorporated by Reference

Chapter 30: Section 39N. Construction contracts; equitable adjustment in contract price for differing subsurface or latent physical conditions.

Section 39N. Every contract subject to section forty-four A of chapter one hundred and forty-nine or subject to section thirty-nine M of chapter thirty shall contain the following paragraph in its entirety and an awarding authority may adopt reasonable rules or regulations in conformity with that paragraph concerning the filing, investigation and settlement of such claims:

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.

Chapter 30: Section 39O. Contracts for construction and materials; suspension, delay or interruption due to order of awarding authority; adjustment in contract price; required provisions.

Section 39O. Every contract subject to the provisions of section thirty-nine M of this chapter or subject to section forty-four A of chapter one hundred forty-nine shall contain the following provisions (a) and (b) in their entirety and, in the event a suspension, delay, interruption or failure to act of the awarding authority increases the cost of performance to any subcontractor, that subcontractor shall have the same rights against the general contractor for payment for an increase in the cost of his performance as provisions (a) and (b) give the general contractor against the awarding authority, but nothing in provisions (a) and (b) shall in any way change, modify or alter any other rights which the general contractor or the subcontractor may have against each other.

(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.

Chapter 30: Section 39P. Contracts for construction and materials; decisions of awarding authority on interpretation of specifications, etc. required promptly upon submission; time limit; notice.

Section 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.

Chapter 30: Section 39Q. Contracts for capital facility construction, etc.; contents; annual claims report.

Section 39Q. (1) Every contract awarded by any state agency as defined by section thirty-nine A of chapter seven for the construction, reconstruction, alteration, remodeling, repair or demolition of any capital facility as defined by the aforesaid section thirty-nine A shall contain the following subparagraphs (a) through (d) in their entirety:

(a) Disputes regarding changes in and interpretations of the terms or scope of the contract and denials of or failures to act upon claims for payment for extra work or materials shall be resolved according to the following procedures, which shall constitute the exclusive method for resolving such disputes. Written notice of the matter in dispute shall be submitted promptly by the claimant to the chief executive official of the state agency which awarded the contract or his designee. No person or business entity having a contract with a state agency shall delay, suspend, or curtail performance under that contract as a result of any dispute subject to this section. Any disputed order, decision or action by the agency or its authorized representative shall be fully performed or complied with pending resolution of the dispute.

(b) Within thirty days of submission of the dispute to the chief executive official of the state agency or his designee, he shall issue a written decision stating the reasons therefor, and shall notify the parties of their right of appeal under this section. If the official or his designee is unable to issue a decision within thirty days, he shall notify the parties to the dispute in writing of the reasons why a decision cannot be issued within thirty days and of the date by which the decision shall issue. Failure to issue a decision within the thirty-day period or within the additional time period specified in such written notice shall be deemed to constitute a denial of the claim and shall authorize resort to the appeal procedure described below. The decision of the chief executive official or his designee shall be final and conclusive unless an appeal is taken as provided below.

(c) Within twenty-one calendar days of the receipt of a written decision or of the failure to issue a decision as stated in the preceding subparagraph, any aggrieved party may file a notice of claim for an adjudicatory hearing with the division of hearing officers or the aggrieved party may file an action directly in a court of competent jurisdiction and shall serve copies thereof upon all other parties in the form and manner prescribed by the rules governing the conduct of adjudicatory proceedings of the division of hearing officers. In the event an aggrieved party exercises his option to file an action directly in court as provided in the previous sentence, the twenty-one day period shall not apply to such filing and the period of filing such action shall be the same period otherwise applicable for filing a civil action in superior court. The appeal shall be referred to a hearing officer experienced in construction law and shall be prosecuted in accordance with the formal rules of procedure for the conduct of adjudicatory hearings of the division of hearing officers, except as

provided below. The hearing officer shall issue a final decision as expeditiously as possible, but in no event more than one hundred and twenty calendar days after conclusion of the adjudicatory hearing, unless the decision is delayed by a request for extension of time for filing post-hearing briefs or other submissions assented to by all parties. Whenever, because an extension of time has been granted, the hearing officer is unable to issue a decision within one hundred and twenty days, he shall notify all parties of the reasons for the delay and the date when the decision will issue. Failure to issue a decision within the one hundred and twenty-day period or within the additional period specified in such written notice shall give the petitioner the right to pursue any legal remedies available to him without further delay.

(d) When the amount in dispute is less than ten thousand dollars, a contractor who is party to the dispute may elect to submit the appeal to a hearing officer experienced in construction law for expedited hearing in accordance with the informal rules of practice and procedure of the division of hearing officers. An expedited hearing under this subparagraph shall be available at the sole option of the contractor. The hearing officer shall issue a decision no later than sixty days following the conclusion of any hearing conducted pursuant to this subparagraph. The hearing officer's decision shall be final and conclusive, and shall not be set aside except in cases of fraud.

(2) The commissioner of administration shall require the division of hearings officers to prepare annually a report concerning the construction contract claims submitted to the division during the preceding twelve months, in such form as the commissioner shall prescribe. The report shall contain, at a minimum, the following information: the number of claims submitted; the names of all parties to each such claim; a brief description of the claim; the date of submission and of disposition of the claim; its disposition, whether by settlement, withdrawal, default or written decision; and the number of claims currently pending. The original of the report shall be submitted to the commissioner of administration by January fifteenth, and a copy shall be filed with the state librarian and shall be a public document.

Chapter 30: Section 39R. Definitions; contract provisions; management and financial statements; enforcement.

Section 39R. (a) The words defined herein shall have the meaning stated below whenever they appear in this section:

(1) ""Contractor" means any person, corporation, partnership, joint venture, sole proprietorship, or other entity awarded a contract pursuant to sections thirty-eight A %p1/2%p to thirty-eight O, inclusive, of chapter seven and any contract awarded or executed pursuant to section eleven C of chapter twenty-five A, section thirty-nine M of chapter thirty, or sections forty-four A to forty-four H, inclusive, of chapter one hundred and forty-nine, which is for an amount or estimated amount greater than one hundred thousand dollars.

(2) ""Contract" means any contract awarded or executed pursuant to sections thirty-eight A %p1/2%p to thirty-eight O, inclusive, of chapter seven and any contract awarded or executed pursuant to section eleven C of chapter twenty-five A, section thirty-nine M of chapter thirty, or sections forty-four A through forty-four H, inclusive, of chapter one hundred and forty-nine, which is for amount or estimated amount greater than one hundred thousand dollars.

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

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

(5) ""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.
(6) ""Accountant's Report", when used in regard to financial statements, means a document in which an independent certified public accountant indicates the scope of the audit which he has made and sets forth his opinion regarding the financial statements taken as a whole with a listing of noted exceptions and qualifications, or an assertion to the effect that an overall opinion cannot be expressed. When an overall opinion cannot be expressed the reason therefor shall be stated. An accountant's report shall include as a part thereof a signed statement by the responsible corporate officer attesting that management has fully disclosed all material facts to the independent certified public accountant, and that the audited financial statement is a true and complete statement of the financial condition of the contractor.
(7) ""Management", when used herein, means the chief executive officers, partners, principals or other person or persons primarily responsible for the financial and operational policies and practices of the contractor.
(8) Accounting terms, unless otherwise defined herein, shall have a meaning in accordance with generally accepted accounting principles and auditing standards.
(b) Subsection (a)(2) hereof notwithstanding, every agreement or contract awarded or executed pursuant to sections thirty-eight A %p1/2%p to thirty-eight O, inclusive, of chapter seven, or eleven C of chapter twenty-five A, and pursuant to section thirty-nine M of chapter thirty or to section forty-four A through H, inclusive, of chapter one hundred and forty-nine, shall provide that:
(1) The contractor shall make, and keep for at least six years after final payment, books, records, and accounts which in reasonable detail accurately and fairly reflect the transactions and dispositions of the contractor, and
(2) until the expiration of six years after final payment, the office of inspector general, and the commissioner of capital asset management and maintenance shall have the right to examine any books, documents, papers or records of the contractor or of his subcontractors that directly pertain to, and involve transactions relating to, the contractor or his subcontractors, and
(3) if the agreement is a contract as defined herein, the contractor shall describe any change in the method of maintaining records or recording transactions which materially affect any statements filed with the awarding authority, including in his description the date of the change and reasons therefor, and shall accompany said description with a letter from the contractor's independent certified public accountant approving or otherwise commenting on the changes, and
(4) if the agreement is a contract as defined herein, the contractor has filed a statement of management on internal accounting controls as set forth in paragraph (c) below prior to the execution of the contract, and
(5) if the agreement is a contract as defined herein, the contractor has filed prior to the execution of the contracts and will continue to file annually, an audited financial statement for the most recent completed fiscal year as set forth in paragraph (d) below.
(c) Every contractor awarded a contract shall file with the awarding authority a statement of management as to whether the system of internal accounting controls of the contractor and its subsidiaries reasonably assures that:
(1) transactions are executed in accordance with management's general and specific authorization;
(2) transactions are recorded as necessary
i. to permit preparation of financial statements in conformity with generally accepted accounting principles, and
ii. to maintain accountability for assets;
(3) 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.
Every contractor awarded a contract shall also file with the awarding authority a statement prepared and signed by an independent certified public accountant, stating that he 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 this paragraph and paragraph (b) above are consistent with the result of management's evaluation of the system of internal accounting controls; and
(2) whether such representations of management are, in addition, reasonable with respect to transactions and assets in amounts which would be material when measured in relation to the applicant's financial statements.
(d) Every contractor awarded a contract by the commonwealth or by any political subdivision thereof shall annually file with the commissioner of capital asset management and maintenance during the term of the contract a financial statement prepared by an independent certified public accountant on the basis of an audit by such accountant. The final statement filed shall include the date of final payment. All statements shall be accompanied by an accountant's report. Such statements shall be made available to the awarding authority upon request.
(e) The office of inspector general, the commissioner of capital asset management and maintenance and any other awarding authority shall enforce the provisions of this section. The commissioner of capital asset management and maintenance may after providing an opportunity for the inspector general and other interested parties to comment, promulgate pursuant to the provisions of chapter thirty A such rules, regulations and guidelines as are necessary to effectuate the purposes of this section. Such rules, regulations and guidelines may be applicable to all awarding authorities. A contractor's failure to satisfy any of the requirements of this section may be grounds for debarment pursuant to section forty-four C of chapter one hundred and forty-nine.
(f) Records and statements required to be made, kept or filed under the provisions of this section shall not be public records as defined in section seven of chapter four and shall not be open to public inspection; provided, however, that such records and statements shall be made available pursuant to the provisions of clause (2) of paragraph

ATTACHMENT C
GENERAL TERMS AND CONDITIONS

TOWN OF EGREMONT
STANDARD CONSTRUCTION CONTRACT

GENERAL CONDITIONS OF THE CONTRACT

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Appendix A -- Statutory Provisions Incorporated by reference
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1.0 GENERAL PROVISIONS

1.1 Scope of the Work. The Work comprises the completed project described in the Contract Documents and includes all labor, professional services, transportation, tools, materials, supplies, equipment, permits, approvals, documents, calculations, submittals, and certificates necessary to develop, perform, construct and complete the project in accordance with all applicable laws, ordinances, and regulations, and in accordance with the Contract Documents.

1.2 Interpretation. 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 part of the Work to be performed by the Contractor. Capitalized terms not otherwise defined herein shall have the meanings assigned to them in the Owner-Contractor Agreement.

1.3 Administrator. The term "Administrator" means the person appointed by the Awarding Authority to administer this Contract. The Contractor shall address mail to the Administrator c/o the Awarding Authority.

1.4 Written Authorization. Actions taken, and approvals and decisions made by the Awarding Authority under this Contract require the prior approval and signature of the Administrator. These include, but are not limited to, the following: changes in the Contract Price, time for completion, or any other provision of this Contract; written orders, notices, and approvals given by the Awarding Authority pursuant to the Contract Documents or pursuant to any laws applicable to this Contract, including approval of "or equal" submissions; issuance of stop work orders; approval of Contractor's applications for payment; and termination of the Contract. Work undertaken by the Contractor not authorized by the Administrator's signature prior to the start of such work shall be considered unauthorized work and shall not entitle the Contractor to any extra payment. The Contractor shall perform, at its own expense, corrective measures required by the Awarding Authority due to any failure to obtain the prior approval of the Administrator for any item of work.

1.3 Contractor's General Duties. The Contractor shall perform the Work in a competent manner in accordance with the Contract Documents and all applicable laws. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures, and coordination of all portions of the Work under this Contract. The Contractor shall provide and perform for the Contract Price all of the duties and obligations set forth in the Contract Documents. 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 legal requirements, the Contractor shall promptly notify the Awarding Authority of that fact in writing. If the Contractor performs Work knowing it to be contrary to legal requirements, the Contractor shall be liable for all damages caused thereby, including the cost of correcting the Work.

1.4 Sales Tax Exemption and Other Taxes. To the extent that materials and supplies are used or incorporated in the performance of this Contract, the Contractor is considered an exempt purchaser under the Massachusetts Sales Act, Chapter 14 of

the Acts of 1966. The Contractor shall pay all taxes and tariffs of any sort related to the Work, subject to the applicable exemptions.

1.5 Permits, Fees and Notices. The Contractor shall secure and pay for all permits and governmental fees, licenses, and inspections necessary for proper execution and completion of the Work. The Contractor shall coordinate all efforts required to obtain these permits unless otherwise directed in writing by the Awarding Authority. The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations, codes, and lawful orders of public authorities bearing on the performance of the Work.

1.6 Safety Requirements. The Contractor shall comply with all Federal, State, and local safety laws and regulations applicable to the Work.

1.7 Minimum Wage Rates. The Contractor shall comply with M.G.L. c. 149, §§26-27H. The wage schedule found in Exhibit A to the Instructions to Bidders lists the minimum wage rates that must be paid to all workers employed in the Work throughout the term of this Contract, subject to the exceptions provided in M.G.L c.149, §§ 26-27H.. The Awarding Authority is not responsible for any errors, omissions, or misprints in the said schedule. The Contractor shall not have any claim for extra compensation from the Awarding Authority arising from the fact that the actual wages paid to workers employed in the Work exceed the rates listed on the schedule or as otherwise provided by law. The Contractor shall cause a copy of the schedule to be posted 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, §34B).

1.8 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.

1.9 Safety Requirements; OSHA Training[M.G.L. c. 30, s. 39S]. The Contractor shall comply and shall cause all subcontractors and persons employed on the Work to comply with all applicable safety requirements. By executing this contract the Contractor hereby certifies that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and that all employees to be employed in the work subject to this bid 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. Any employee found on a worksite subject to this section without documentation of successful completion of 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 shall be subject to immediate removal.

1.10 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 six years from the date of completion of the Contract. Such records shall be open to inspection by any authorized representative of the Awarding Authority or 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 Executive Department of Labor within fifteen days after completion of its portion of the Work a signed statement in the form required by the Awarding Authority.

1.11 Workforce Qualifications. The Contractor shall: (i) employ competent workers; (ii) enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work; (iii)not permit employment of unfit persons or persons not skilled in tasks assigned to them. Whenever the Administrator shall notify the Contractor in writing that any worker is, in the Administrator's opinion, incompetent, unfaithful, disorderly, or otherwise unsatisfactory, such employee shall be discharged from the Work and shall not again be employed on the Work except with the consent of the Administrator.

1.12 Affirmative Action, Non-Discrimination in Hiring and Employment. Pursuant to Executive Order #478, by signing this Contract the Contractor hereby certifies under the pains and penalties of perjury that the Contractor currently complies with and will continue to comply with all federal and state laws, rules and regulations promoting fair employment practices or prohibiting employment discrimination and unfair labor practices and shall not discriminate in the hiring of any applicant for employment nor shall any qualified employee be demoted, discharged or otherwise subject to discrimination in the tenure, position, promotional opportunities, wages, benefits or terms and conditions of their employment because of race, color, national origin, ancestry, age, sex, religion, disability, handicap, sexual orientation or for exercising any rights afforded by law. Pursuant to Executive Order #390, the Contractor commits to purchasing supplies and services from certified minority or women-owned businesses, small businesses or businesses owned by socially or economically disadvantaged persons or persons with disabilities.

1.13 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, within such preference, preference shall be given to service-disabled veterans; and secondly, to citizens of the Commonwealth generally who have been residents of the Commonwealth for at least six months at the commencement of their employment, and if they cannot be obtained in sufficient numbers, then to citizens of the United States.

1.14 Employment Eligibility Verification Requirements [8 U.S.C., ss. 1324a,1324b; M.G.L. c. 149, s. 19C; Executive Order No. 481]. The Contractor hereby certifies under pains and penalties of perjury as a condition of receiving this Contract, that it shall not knowingly use undocumented workers in connection with the performance of the Work and that, pursuant to the requirements of federal law,

the Contractor shall verify the immigration status of all workers employed in connection with the Work without engaging in unlawful discrimination, and that Contractor shall not knowingly or recklessly alter, falsify, or knowingly or recklessly accept altered or falsified documents of any worker. The Contractor shall cause all subcontractors to comply with this provision. The Contractor shall comply with Federal Department of Homeland Security Requirements in hiring any and all "employees" to be employed on the Work who are required to be listed in the certified payroll reports for the Work. Without limitation, such requirements shall include the good faith completion of the Federal Department of Homeland Security 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) simultaneously with the execution of this Contract. The contractor shall require each of its subcontractors and sub subcontractors to execute and provide to the Contractor an I-9 Certificate with the execution of each subcontract, and the Contractor shall immediately provide a copy to the Awarding Authority. The Contractor shall certify in each certified payroll report submitted to the Awarding Authority that the Form I-9 process was faithfully completed for all employees listed on the payroll report. Violation of this Section shall constitute a material breach of this Contract, subjecting the Contractor to sanctions including but not limited to monetary penalties, withholding of payments, contract suspension, or termination.

1.15 Weekly or Biweekly wage payments [M.G.L. c. 149, s. 148] 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.

1.16 Anti-Boycott Covenant [Executive Order #130]. The Contractor warrants that during the time this Contract is in effect, neither it or any affiliated company, as hereafter defined, participates in or cooperates with an international boycott, as defined in Section 999(b) (3) and (4) of the Internal Revenue Code of 1954, as amended, or engages in conduct declared to be unlawful by M.G.L. c. 151E, s. 2. If there shall be a breach in the warranty, representation or agreement contained in this paragraph, then without limiting such other rights as it may have the Awarding Authority shall be entitled to rescind this contract. As used herein, an affiliated company shall be any business entity of which at least 51% of the ownership interests are directly or indirectly owned by the Contractor or by a person or persons or business entity or entities directly or indirectly owning at least 51% of the Ownership interests of the Contractor; or which directly or indirectly owns at least 51% of the Ownership interests of the Contractor.

1.17 Labor Harmony [M.G.L. c. 30, s. 39S]. By executing this contract the Contractor hereby certifies that (1) that Contractor is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work. 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

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.

1.18 Risk of Loss. The Contractor shall bear the risk of loss with respect to any of its or its agents', employees' or subcontractors' vehicles, equipment or tools brought onto or left at the worksite and for any materials stored at the worksite.

1.19 Northern Ireland Certification [M.G.L. c. 7, s. 22C]. The Contractor certifies that it does not employ ten or more employees in an office or other facility in Northern Ireland and if the Contractor employs ten or more employees in an office or other facility located in Northern Ireland the Contractor certifies that it does not discriminate in employment, compensation, or the terms, conditions and privileges of employment on account of religious or political belief; and it promotes religious tolerance within the work place, and the eradication of any manifestations of religious and other illegal discrimination; and the Contractor is not engaged in the manufacture, distribution or sale of firearms, munitions, including rubber or plastic bullets, tear gas, armored vehicles or military aircraft for use or deployment in any activity in Northern Ireland.

1.20 Energy Efficiency. The Contractor commits to meet the minimum energy performance standards required pursuant to Executive Order # 484. If the Contract is for a project over 20,000 square feet, it must meet the Mass. LEED Plus building standard including: 1) certification by the U.S. Green Building Council Leadership in Energy and Environmental Design (LEED) program; 2) energy performance 20% better than the Massachusetts Energy Code; 3) independent 3rd party commissioning; 4) reduction of outdoor water consumption by 50% and indoor water consumption by 20% relative to standard baseline projections; and 5) conformance with at least 1 of 4 identified smart growth criteria.

If the Contract is for a project under 20,000 square feet, it must meet the minimum energy performance standards established by the Commonwealth of Massachusetts Sustainable Design Roundtable.

2.0 MATERIALS AND EQUIPMENT WARRANTY

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 inform itself as to, and shall comply with, the provisions of M.G.L. c. 7, s. 23A, as amended, and shall abide by the same and all applicable rules, regulations and orders made thereunder in relation to the purchase of supplies and materials in the execution of the Work, including the provisions of M.G.L. c.7, s. 22, paragraph 17 which provides that there be *"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."*

3.0 PROSECUTION OF THE WORK -- LIQUIDATED DAMAGES

3.1. Beginning, Progress Schedule. The Contract time shall commence upon the date specified in the Notice to Proceed executed by the Administrator and delivered to the Contractor after the execution of this Contract. The Contractor shall begin Work at the Site within ten days of said date unless otherwise ordered in writing by the Awarding Authority. Prior to commencing the Work, the Contractor shall meet with representatives of the Awarding Authority to discuss the quality assurance program, safety program, labor provisions, progress schedule, schedule of values, and other Contract procedures. Upon Approval by the Administrator, the progress schedule shall constitute the progress schedule for the Work. Upon approval by the Administrator, the schedule of values shall be the basis for payment for the Work. The Contractor shall at the end of each month, or more often if required, furnish 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 approved progress schedule.

3.2 Time for Completion of Work. 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 subject only to extensions specifically permitted in accordance with the terms of this Contract.

3.3 Definition of "Substantial Completion." For the purposes of this Contract the term "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 the purposes of the preceding sentences the term "substantially completes" means that the work required by the Contract has been completed except for minor incomplete or unsatisfactory work items that do not materially impair the usefulness of the Work.

3. 4 Failure to Complete Work on Time - Liquidated Damages.
The Awarding Authority has determined that its damages as a result of Contractor's failure to complete the Work to Substantial Completion within the Contract time will be difficult or impracticable to ascertain. Accordingly, 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 Substantial Completion. Such moneys shall be paid as liquidated damages, and not as a penalty, to cover losses and expenses to the Awarding Authority resulting solely from the fact that the Work is not completed on time. 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.

3.5 Collection of Liquidated Damages. The Awarding Authority may recover 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.

3.6 Awarding Authority's Approvals and Interpretations. Decisions by the Awarding Authority regarding interpretation of the specifications, approval of equipment, material or any other approval, or progress of the Work, shall be made promptly and, in any event, no later than thirty days after the Contractor's written submission for decision; but if such decision requires extended investigation and study, the Awarding Authority shall, within thirty days after the receipt of the submission, give the Contractor 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.

3.7 Extension for Delays Caused by Awarding Authority. The only circumstances under which the Contract Price shall be increased due to delays caused by the Awarding Authority are those specified in M.G.L. c. 30, §390 appearing in Appendix A to these General Conditions of the Contract. In all other cases the Contractor shall be entitled neither to increase the Contract Price nor to receive damages on account of any hindrances or delays, avoidable or unavoidable, but if the delay is caused by the Awarding Authority, the Contractor shall be entitled to an extension of time to the extent provided in M.G.L. c. 30, §390. The Contractor must submit any claim under this paragraph to the Awarding Authority in writing as soon as practicable after the end of the Awarding Authority's suspension, delay, interruption or failure to act and, in any event, not later than the date of final payment under this Contract. Except for costs due to a suspension order, the Awarding Authority shall not approve any costs in the claim incurred more than 20 days before the Contractor notified the Awarding Authority in writing of the act or failure to act or the Awarding Authority that gave rise to the claim.

3.8 Awarding Authority's Right to Reject Defective Materials and Work. Except as otherwise provided herein, the Awarding Authority's inspection of the Work shall not relieve the Contractor of any of its responsibilities hereunder, and defective work shall be corrected. The Awarding Authority may reject unsuitable work, notwithstanding that such work and materials have been previously accepted for payment. If any part of the Work shall be found defective at any time before the final acceptance of the whole Work, the Contractor shall promptly correct such defect in a manner satisfactory to the Awarding Authority. If any material brought upon the site for use in the Work shall be rejected by the Awarding Authority as not in conformity with the Contract Documents, the Contractor shall promptly remove such materials from the site.

3.9 Substantial Completion of the Work; Final Completion; Awarding Authority's Remedies. When the Work has reached the point of Substantial Completion as shown on Approved payment request, the Contractor shall assist the Awarding Authority in the development of a punch list identifying those items of unfinished or unacceptable Work that remain to be performed or corrected under the Contract. The Contractor shall complete the lunch list items to final completion within 30 days after the Awarding Authority's approval of the punch list. At any time after the value of the Work remaining to be done is, in the estimation of the Awarding Authority, less than 1 per cent of the adjusted Contract price, or the

Awarding Authority has determined that the Contractor has substantially completed the work and the Awarding Authority has taken possession for occupancy, the Awarding Authority may send to the Contractor by certified mail, return receipt requested, a complete and final list of all incomplete and unsatisfactory work items, including, for each item on the list, a good faith estimate of the fair and reasonable cost of completing such item. The Contractor shall then complete all such work items within 30 days of receipt of such list or before the Contract completion date, whichever is later. If the Contractor fails to complete all incomplete and unsatisfactory work items within 45 days after receipt of such items furnished by the Awarding Authority or before the Contract completion date, whichever is later, subsequent to an additional 14 days' written notice to the Contractor by certified mail, return receipt requested, the Awarding Authority may terminate this Contract and complete the incomplete and unsatisfactory work items and charge the cost of same to the Contractor and such termination shall be without prejudice to any other rights or remedies the Awarding Authority may have under this Contract.

4.0 CHANGES IN THE WORK

4.1 Changes within the Scope of the Work. 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 Awarding Authority-furnished facilities, equipment, materials, services, or Site; or (4) the schedule for performance of the Work. The Contractor shall immediately perform any change order work that is ordered in writing by the Awarding Authority.

4.2. Request for Equitable Adjustment due to Change Order. Whenever a change order is issued by the Awarding Authority that will cause a change in the Contractor's cost or time for performance, the Contractor or the Awarding Authority may request an equitable adjustment in the Contract Price or the Contract time. A request for such an adjustment shall be in writing and shall be submitted by the party making such claim to the other party.

4.3. Latent Conditions. 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 indicated in the Contract Documents, then either the Contractor or the Awarding Authority may request an equitable adjustment in the Contract Price in accordance with M.G.L. c.30, §39N appearing in Appendix A attached to these General Conditions of the Contract. Likewise if the latent or subsurface physical condition causes a change in the time for performing the Work, either the Contractor or the Awarding Authority may request an equitable adjustment of the time for the performance of the Work.

4.4 Computation of Equitable Adjustments. 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 (said 20% allowance shall be paid to the Contractor and the Contractor and said subcontractors shall agree upon the distribution of this amount as a matter of contract between them)., (d) plus (or minus) the actual direct additional premium costs and expenses incurred as a result of collective bargaining agreements or other agreements between organized labor and employers, and plus (or minus) (e) the actual direct premium cost of payment and performance bonds required of Contractor and filed Subcontractors for this Contract. 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.

4.4 Appeal Procedure. If the Contractor disputes a change, an equitable adjustment, or a Contract interpretation by the Awarding Authority, the Contractor shall follow the procedures set forth in M.G.L. c. 30, §39Q appearing in Appendix A to these General Conditions of the Contract.

5.0 PAYMENT PROVISIONS

5.1 Applications for Periodic Payments. Once each month, on a date established at the beginning of the Work, the Contractor shall deliver to the Awarding Authority an itemized Application for Payment, supported by such data substantiating the Contractor's right to payment as the Awarding Authority may require. The application shall reflect a minimum of 5% retainage and shall be subject to, and processed in accordance with, the provisions of M.G.L. c. 30, §39K appearing in Appendix A to these General Conditions. 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.

5.2 Deductions by the Awarding Authority. The Awarding Authority may deduct from any application for a periodic payment submitted by the Contractor a retention based upon the value of its claims against the Contractor plus a retention of 5% of the approved amount of the Application for Payment and any other amounts authorized by M.G.L. c. 30, §39K.

5.3 Final Payment. Final Payment under this Contract shall be processed in accordance with the procedures set forth in M.G.L. c. 30, §39K. The acceptance by the Contractor of the last payment due under this Contract or the Contractor's execution of the Final Certificate of Completion, shall operate as a release to the Awarding Authority from all claims and liability related to this Contract.

6.0 WARRANTIES AND GUARANTEE

6.1 Warranty. The Contractor warrants to the Awarding Authority that materials and equipment furnished under the Contract will be of good quality and new unless otherwise required or permitted by the Contract Documents, that the Work will be free from defects not inherent in the quality required or permitted, and that the Work will conform with the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective.

6.2 General Guaranty. If at any time during the period of one (1) year from the date of the its substantial completion, as shown on an approved payment request, the Work or any part of the Work shall in the reasonable determination of the Awarding Authority require replacing or repairing due to the fact that it is broken, defective, or otherwise does not conform to the Contract Documents, the Awarding Authority will notify the Contractor to make the required repairs or replacement. If the Contractor shall neglect to commence such repairs or replacements to the satisfaction of the Awarding Authority within ten (10) days from the date of giving or mailing such notice, then the Awarding Authority may employ other persons to make said repairs or replacements. The Contractor agrees, upon demand, to pay to the Awarding Authority all amounts which the Awarding Authority expends for such repairs or replacements. For items of work completed after substantial completion, the one-year guarantee shall commence at the time the Awarding Authority approves of the completion of such items. This one-year guarantee shall not limit any express guaranty or warranty required to be assigned to the Awarding Authority pursuant to the terms of the Plans and Specifications.

7.0 INSURANCE REQUIREMENTS

7.1 Insurance Generally.

A. The Contractor shall purchase and maintain insurance of the type and limits 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 lawfully authorized to write that type of insurance under the laws of the Commonwealth with a financial strength rating of "A-" or better as assigned by AM Best Company, or an equivalent rating assigned by a similar rating agency acceptable to the Awarding Authority, 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 each type of insurance, insurance company, policy number, amount of insurance, deductibles and/or self-insured retentions, and policy effective and expiration dates. Certificates shall show the Awarding Authority and the Owner and anyone else the Awarding Authority requests as an additional insured as to all policies of liability insurance. Certificates shall specifically note the following:

- that the General Liability policy includes contractual liability
- that the General Liability policy includes the Owner and Awarding Authority as additional insureds for ongoing operations (CG 20 10) and for completed operations (CG 37 10) or equivalent endorsements.
- that the automobile liability, umbrella liability and pollution liability policies include the Owner and Awarding Authority as additional insureds
- that the General Liability policy includes endorsement CG 24 04 or equivalent, a Waiver of Subrogation in favor of the Owner and Awarding Authority
- that the Builders' Risk or Installation Floater is on an all risk basis including earthquake and flood, and includes the Owner and Awarding Authority, contractor, subcontractors and suppliers of any tier as named insureds or loss payees as their interests may appear.
- 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.

D. The Contractor shall file one certified complete copy of all policies and endorsements 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.

F. The Contractor is responsible for the payment of any and all deductibles under all of the insurance required below. Neither the Owner nor the Awarding Authority shall in any instance be responsible for the payment of deductibles, self-insured retentions, or any portion thereof.

7.2 <u>Contractor's Commercial General Liability.</u>

A. The Contractor shall purchase and maintain general liability coverage on the ISO form CG 00 01 or equivalent, including products and completed operations, on an occurrence basis. The form must be amended to state that the aggregate limit applies on a per location/project basis. The policy shall provide the following minimum coverage to protect the Contractor from claims with respect to the operations performed by Contractor and any employee, subcontractor, or supplier, or by anyone for whose acts they may be liable 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	$2,000,000 general aggregate, 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 and acceptance by the Awarding Authority. The Contractor shall provide renewal certificates of insurance to the Awarding Authority as evidence that this coverage is being maintained.

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 the Owner and Awarding Authority and anyone else requested by the Awarding Authority as additional insureds via endorsements CG 20 10 for ongoing operations and CG 20 37 for completed operations This policy shall be primary and non-contributory with respect to any other insurance available to additional insureds.

G. The policy shall include endorsement CG 24 04, a Waiver of Subrogation in favor of the Awarding Authority and Owner.

7.3 <u>Automobile Liability.</u>

A. The Contractor shall purchase and maintain the following minimum coverage with respect to the operations of any owned, non-owned, and hired vehicles including trailers used in the performance of the work, 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 & Property Damage $1,000,000 combined single limit

B. The policy shall include a CA 99 48 Broadened Pollution Endorsement. If specified in Exhibit A. to the Owner – Contractor Agreement, the Contractor, if hauling contaminants and/or pollutants, must adhere to Sections 29 and 30 of the Motor Carrier Act of 1980, which shall include coverage Form MCS-90.

C. The policy shall name the Owner and Awarding Authority as Additional Insureds.

D. The policy shall contain a Waiver of Subrogation in favor of the Awarding Authority and Owner.

7.4 <u>Worker's Compensation.</u>

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 A to the Owner - Contractor Agreement, in which case the Contractor shall provide the higher coverage:

Worker's Compensation	Statutory limits
Employer's Liability	$ 500,000 each accident
	$ 500,000 disease per employee
	$ 500,000 disease policy aggregate

B. The policy shall contain a Waiver of Subrogation in favor of the Owner and the Awarding Authority.

7.5 <u>Umbrella Coverage.</u>

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:

Limit of liability: $3,000,000 per occurrence

7.6 <u>Additional types of Insurance.</u>

The Contractor shall provide such other types of insurance as may be required by Exhibit A to the Owner - Contractor Agreement.

8.0 INDEMNIFICATION

The Contractor shall indemnify, defend (with counsel subject to the supervision of the Attorney General of the Commonwealth of Massachusetts as required by M.G.L. c. 12, §3) and hold harmless the Awarding Authority and the Commonwealth 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 8.

9.0 BONDS

The Contractor shall provide the Awarding Authority with a Performance Bond and a Payment or Labor and Materials Bond in the form provided by the Awarding Authority, executed by a surety company licensed by the Commonwealth of Massachusetts' Division of Insurance and whose name appears on United States Treasury Department Circular 570. Both the Performance Bond and the Payment Bonds shall be in an amount equal to the Contract Sum unless, with respect to the Payment Bond or Labor and Materials Bond a lesser amount of no less than one half the contract price is expressly specified in the Advertisement or Instructions to Bidders, or with respect to the Performance Bond no such bond is required as expressly set forth in the Advertisement or Instructions to Bidders.

10.0 TERMINATION

10.1 Termination for Cause.

The Awarding Authority may terminate this Contract for cause if it determines that any of the following circumstances have occurred:

-- the Contractor is adjudged bankrupt or has made a general assignment for the benefit of its creditors;

-- a receiver has been appointed of the Contractor's property;

-- all or a part of the Work has been abandoned;

-- 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 Awarding Authority, except as provided in the Contract Documents;

-- the Awarding Authority has determined that the rate of progress required on the project is not being met;

-- the Contractor has substantially violated any provisions of this Contract.

The Awarding Authority may complete the Work or any part thereof, and charge its expense of so completing the work or part thereof, to the Contractor. The Awarding Authority may take possession of and use any materials, machinery, implements and

tools found upon the site of said Work. The Awarding Authority 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 Project site after the Awarding Authority has no further use for them.

10.2 Termination for Convenience.

(a) In the event that this Contract is terminated by the Awarding Authority prior to the completion of construction and termination is not based on a reason listed in Paragraph 10.1, the Contractor shall be compensated for its costs incurred, including reasonable costs of de-mobilization, calculated on a percent completion basis covering the period of time between the last Approved application for payment and the date of termination.

(b) Payment by the Awarding Authority pursuant to Subparagraph 10.2(a) shall be deemed to fully compensate the Contractor for all claims and expenses directly or indirectly attributable to the termination, including any claims for lost profits.

11. NON-APPROPRIATION

The Commonwealth certifies that at the time of the execution of this Contract, sufficient appropriations exist and shall be encumbered to fund the Contract Price. Payments are subject to appropriation and shall be made only for work performed in accordance with the terms of this Contract. The Contractor shall not be obligated to perform, and may not perform, work outside the duration and scope of this Contract without an appropriate amendment to this Contract, and a sufficient appropriation(s) to support such additional work. The Commonwealth may immediately terminate or suspend this Contract in the event that the appropriation(s) funding this Contract is eliminated or reduced to an amount which will be insufficient to support anticipated future obligations under this Contract.

12. RECORDS AND LAWS

The Contractor shall make, and keep for at least six years after final payment, books, records, and accounts, which in reasonable detail accurately and fairly reflect the transactions and dispositions of the Contractor. [M.G.L. c. 30, §39R(b)(1)-(2)].

Until the expiration of six years after final payment, the Office of the Inspector General, and the Commissioner of DCAM shall have the right to examine any books, documents, papers or records of the Contractor or of its subcontractors that directly pertain to, and involve transactions relating to, the Contractor or its subcontractors. [M.G.L. c. 30, §39R(b)(1)-(2)]. If this is a materials contract with a contract price of over $100,000 the contractor shall also comply with M.G.L. c. 30, §39R(c). Furthermore, pursuant to Executive Order #195, the Governor or his designee, the secretary of administration and finance, and the state auditor or his designee shall have the right at reasonable times and upon reasonable notice to examine the books, records and other compilations of data or the Contractor which pertain to the performance and requirements of this Contract.

13. CHOICE OF LAW

This Contract shall be construed under and governed by the laws of the Commonwealth of Massachusetts. The Contractor, and the agents thereof, agree to

bring any federal or state legal proceedings arising under this Contract, in which either the Commonwealth or the Awarding Authority is a party, in a court of competent jurisdiction within the Commonwealth of Massachusetts. This section shall not be construed to limit any rights a party may have to intervene in any action, in any court or wherever, pending, in which the other is a party.

14. STATUTORY PROVISIONS INCORPORATED BY REFERENCE

The statutory provisions appearing in Appendix A attached hereto are incorporated into this Contract by reference.

APPENDIX A
Statutory Provisions Incorporated by Reference

Chapter 30: Section 39N. Construction contracts; equitable adjustment in contract price for differing subsurface or latent physical conditions.

Section 39N. Every contract subject to section forty-four A of chapter one hundred and forty-nine or subject to section thirty-nine M of chapter thirty shall contain the following paragraph in its entirety and an awarding authority may adopt reasonable rules or regulations in conformity with that paragraph concerning the filing, investigation and settlement of such claims:

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.

Chapter 30: Section 39O. Contracts for construction and materials; suspension, delay or interruption due to order of awarding authority; adjustment in contract price; required provisions.

Section 39O. Every contract subject to the provisions of section thirty-nine M of this chapter or subject to section forty-four A of chapter one hundred forty-nine shall contain the following provisions (a) and (b) in their entirety and, in the event a suspension, delay, interruption or failure to act of the awarding authority increases the cost of performance to any subcontractor, that subcontractor shall have the same rights against the general contractor for payment for an increase in the cost of his performance as provisions (a) and (b) give the general contractor against the awarding authority, but nothing in provisions (a) and (b) shall in any way change, modify or alter any other rights which the general contractor or the subcontractor may have against each other.

(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.

Chapter 30: Section 39P. Contracts for construction and materials; decisions of awarding authority on interpretation of specifications, etc. required promptly upon submission; time limit; notice.

Section 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.

Chapter 30: Section 39Q. Contracts for capital facility construction, etc.; contents; annual claims report.

Section 39Q. (1) Every contract awarded by any state agency as defined by section thirty-nine A of chapter seven for the construction, reconstruction, alteration, remodeling, repair or demolition of any capital facility as defined by the aforesaid section thirty-nine A shall contain the following subparagraphs (a) through (d) in their entirety:

(a) Disputes regarding changes in and interpretations of the terms or scope of the contract and denials of or failures to act upon claims for payment for extra work or materials shall be resolved according to the following procedures, which shall constitute the exclusive method for resolving such disputes. Written notice of the matter in dispute shall be submitted promptly by the claimant to the chief executive official of the state agency which awarded the contract or his designee. No person or business entity having a contract with a state agency shall delay, suspend, or curtail performance under that contract as a result of any dispute subject to this section. Any disputed order, decision or action by the agency or its authorized representative shall be fully performed or complied with pending resolution of the dispute.

(b) Within thirty days of submission of the dispute to the chief executive official of the state agency or his designee, he shall issue a written decision stating the reasons therefor, and shall notify the parties of their right of appeal under this section. If the official or his designee is unable to issue a decision within thirty days, he shall notify the parties to the dispute in writing of the reasons why a decision cannot be issued within thirty days and of the date by which the decision shall issue. Failure to issue a decision within the thirty-day period or within the additional time period specified in such written notice shall be deemed to constitute a denial of the claim and shall authorize resort to the appeal procedure described below. The decision of the chief executive official or his designee shall be final and conclusive unless an appeal is taken as provided below.

(c) Within twenty-one calendar days of the receipt of a written decision or of the failure to issue a decision as stated in the preceding subparagraph, any aggrieved party may file a notice of claim for an adjudicatory hearing with the division of hearing officers or the aggrieved party may file an action directly in a court of competent jurisdiction and shall serve copies thereof upon all other parties in the form and manner prescribed by the rules governing the conduct of adjudicatory proceedings of the division of hearing officers. In the event an aggrieved party exercises his option to file an action directly in court as provided in the previous sentence, the twenty-one day period shall not apply to such filing and the period of filing such action shall be the same period otherwise applicable for filing a civil action in superior court. The appeal shall be referred to a hearing officer experienced in construction law and shall be prosecuted in accordance with the formal rules of procedure for the conduct of adjudicatory hearings of the division of hearing officers, except as

provided below. The hearing officer shall issue a final decision as expeditiously as possible, but in no event more than one hundred and twenty calendar days after conclusion of the adjudicatory hearing, unless the decision is delayed by a request for extension of time for filing post-hearing briefs or other submissions assented to by all parties. Whenever, because an extension of time has been granted, the hearing officer is unable to issue a decision within one hundred and twenty days, he shall notify all parties of the reasons for the delay and the date when the decision will issue. Failure to issue a decision within the one hundred and twenty-day period or within the additional period specified in such written notice shall give the petitioner the right to pursue any legal remedies available to him without further delay.

(d) When the amount in dispute is less than ten thousand dollars, a contractor who is party to the dispute may elect to submit the appeal to a hearing officer experienced in construction law for expedited hearing in accordance with the informal rules of practice and procedure of the division of hearing officers. An expedited hearing under this subparagraph shall be available at the sole option of the contractor. The hearing officer shall issue a decision no later than sixty days following the conclusion of any hearing conducted pursuant to this subparagraph. The hearing officer's decision shall be final and conclusive, and shall not be set aside except in cases of fraud.

(2) The commissioner of administration shall require the division of hearings officers to prepare annually a report concerning the construction contract claims submitted to the division during the preceding twelve months, in such form as the commissioner shall prescribe. The report shall contain, at a minimum, the following information: the number of claims submitted; the names of all parties to each such claim; a brief description of the claim; the date of submission and of disposition of the claim; its disposition, whether by settlement, withdrawal, default or written decision; and the number of claims currently pending. The original of the report shall be submitted to the commissioner of administration by January fifteenth, and a copy shall be filed with the state librarian and shall be a public document.

Chapter 30: Section 39R. Definitions; contract provisions; management and financial statements; enforcement.

Section 39R. (a) The words defined herein shall have the meaning stated below whenever they appear in this section:

(1) ""Contractor" means any person, corporation, partnership, joint venture, sole proprietorship, or other entity awarded a contract pursuant to sections thirty-eight A %p1/2%p to thirty-eight O, inclusive, of chapter seven and any contract awarded or executed pursuant to section eleven C of chapter twenty-five A, section thirty-nine M of chapter thirty, or sections forty-four A to forty-four H, inclusive, of chapter one hundred and forty-nine, which is for an amount or estimated amount greater than one hundred thousand dollars.

(2) ""Contract" means any contract awarded or executed pursuant to sections thirty-eight A %p1/2%p to thirty-eight O, inclusive, of chapter seven and any contract awarded or executed pursuant to section eleven C of chapter twenty-five A, section thirty-nine M of chapter thirty, or sections forty-four A through forty-four H, inclusive, of chapter one hundred and forty-nine, which is for amount or estimated amount greater than one hundred thousand dollars.

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

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

(5) ""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.
(6) ""Accountant's Report", when used in regard to financial statements, means a document in which an independent certified public accountant indicates the scope of the audit which he has made and sets forth his opinion regarding the financial statements taken as a whole with a listing of noted exceptions and qualifications, or an assertion to the effect that an overall opinion cannot be expressed. When an overall opinion cannot be expressed the reason therefor shall be stated. An accountant's report shall include as a part thereof a signed statement by the responsible corporate officer attesting that management has fully disclosed all material facts to the independent certified public accountant, and that the audited financial statement is a true and complete statement of the financial condition of the contractor.
(7) ""Management", when used herein, means the chief executive officers, partners, principals or other person or persons primarily responsible for the financial and operational policies and practices of the contractor.
(8) Accounting terms, unless otherwise defined herein, shall have a meaning in accordance with generally accepted accounting principles and auditing standards.
(b) Subsection (a)(2) hereof notwithstanding, every agreement or contract awarded or executed pursuant to sections thirty-eight A %p1/2%p to thirty-eight O, inclusive, of chapter seven, or eleven C of chapter twenty-five A, and pursuant to section thirty-nine M of chapter thirty or to section forty-four A through H, inclusive, of chapter one hundred and forty-nine, shall provide that:
(1) The contractor shall make, and keep for at least six years after final payment, books, records, and accounts which in reasonable detail accurately and fairly reflect the transactions and dispositions of the contractor, and
(2) until the expiration of six years after final payment, the office of inspector general, and the commissioner of capital asset management and maintenance shall have the right to examine any books, documents, papers or records of the contractor or of his subcontractors that directly pertain to, and involve transactions relating to, the contractor or his subcontractors, and
(3) if the agreement is a contract as defined herein, the contractor shall describe any change in the method of maintaining records or recording transactions which materially affect any statements filed with the awarding authority, including in his description the date of the change and reasons therefor, and shall accompany said description with a letter from the contractor's independent certified public accountant approving or otherwise commenting on the changes, and
(4) if the agreement is a contract as defined herein, the contractor has filed a statement of management on internal accounting controls as set forth in paragraph (c) below prior to the execution of the contract, and
(5) if the agreement is a contract as defined herein, the contractor has filed prior to the execution of the contracts and will continue to file annually, an audited financial statement for the most recent completed fiscal year as set forth in paragraph (d) below.
(c) Every contractor awarded a contract shall file with the awarding authority a statement of management as to whether the system of internal accounting controls of the contractor and its subsidiaries reasonably assures that:
(1) transactions are executed in accordance with management's general and specific authorization;
(2) transactions are recorded as necessary
i. to permit preparation of financial statements in conformity with generally accepted accounting principles, and
ii. to maintain accountability for assets;
(3) 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.
Every contractor awarded a contract shall also file with the awarding authority a statement prepared and signed by an independent certified public accountant, stating that he 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 this paragraph and paragraph (b) above are consistent with the result of management's evaluation of the system of internal accounting controls; and
(2) whether such representations of management are, in addition, reasonable with respect to transactions and assets in amounts which would be material when measured in relation to the applicant's financial statements.
(d) Every contractor awarded a contract by the commonwealth or by any political subdivision thereof shall annually file with the commissioner of capital asset management and maintenance during the term of the contract a financial statement prepared by an independent certified public accountant on the basis of an audit by such accountant. The final statement filed shall include the date of final payment. All statements shall be accompanied by an accountant's report. Such statements shall be made available to the awarding authority upon request.
(e) The office of inspector general, the commissioner of capital asset management and maintenance and any other awarding authority shall enforce the provisions of this section. The commissioner of capital asset management and maintenance may after providing an opportunity for the inspector general and other interested parties to comment, promulgate pursuant to the provisions of chapter thirty A such rules, regulations and guidelines as are necessary to effectuate the purposes of this section. Such rules, regulations and guidelines may be applicable to all awarding authorities. A contractor's failure to satisfy any of the requirements of this section may be grounds for debarment pursuant to section forty-four C of chapter one hundred and forty-nine.
(f) Records and statements required to be made, kept or filed under the provisions of this section shall not be public records as defined in section seven of chapter four and shall not be open to public inspection; provided, however, that such records and statements shall be made available pursuant to the provisions of clause (2) of paragraph

TECHNICAL SPECIFICATIONS

EGREMONT FREE LIBRARY
STABILIZATION AND ACCESSIBILITY IMPROVEMENTS

TECHNICAL SPECIFICATIONS

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DRAWING LIST

Plan Set entitled: "STABILIZATION AND ADA IMPROVEMENTS PROJECT–EGREMONT FREE LIBRARY", Dated: October 6, 2021; Prepared by: Evelyn Cole Smith Architects, LLC and Salamone & Associates, PC.

Sheet/Drawing Number	Sheet/Drawing Title
T-1	Title Sheet
A-1	Floor Plans & Details
A-2	Roof Plan, Elevations, and Details
A-3	Interior Elevations and Schedules
DPME-1	Plumbing/Mechanical/Electrical Demolition Plans
DE-1 ALT	First and Second Floor Electrical Demolition Alternate Plans
PME-1	Plumbing/Mechanical/Electrical Plans
PME-2	Attic Plan
PME-3	Details, Notes, Schedules, Symbols and Abbreviations
E-1 ALT	First and Second Floor Electrical Alternate Plan
E-2 ALT	Attic Electrical Alternate Plan

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SECTION 01051

WORKING PROCEDURES DURING CONSTRUCTION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section discusses the minimum requirements necessary for general coordination and precautionary measures which are to be undertaken by the Contractor during the progression of work generally specified as follows.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 PROJECT COORDINATION AND SCHEDULING

A. The Contractor shall coordinate all construction activities with the Owner, including but not limited to demolition and window and siding installation, as necessary to minimize disruption with facility operations. Sufficient notice shall be provided by the Contractor as necessary for the Owner to make the necessary arrangements to relocate personnel and tenants surrounding areas of work.

B. Prior to the commencement of work, the Contractor shall submit a construction schedule to the Owner establishing the sequencing of work. Construction operations shall be scheduled in such a manner to accommodate the Owner and minimize disruption to facility operations.

3.2 PRECAUTIONARY MEASURES

A. The Contractor shall undertake all necessary precautions to avoid interference and/or disturbance of existing construction to remain resulting from, but not limited to, the demolition of windows and synthetic stucco finish. Any damage resulting from this work, shall be repaired at the Contractor's expense.

3.3 PROTECTION AND CLEANING

A. The Contractor shall maintain an uninterrupted means of building egress and roadway access at all times until completion of the work.

B. The contractor shall attend weekly job progress meetings with the Owner to discuss construction scheduling.

END OF SECTION 01051

SECTION 01100

SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Access to site.
4. Coordination with Users.
5. Work restrictions.
6. Miscellaneous provisions.

1.2 PROJECT INFORMATION

A. Project Identification: Egremont Free Library Stabilization and ADA Improvements.

1. Project Location: 1 Buttonball Lane, South Egremont, MA

B. Owner: The Town of Egremont

C. Architect: Evelyn Cole Smith Architects, LLC

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. Base Bid to include all work associated with structural stabilization of the first floor and belfry timber frame including installation of concrete footings and piers, as described on the drawings. Base Bid work to also include installation of new ADA toilet room, ramp system and associated elements. Alternates for the 1) provision of new carpeting, 2) new fire alarm system and 3) new lighting.

B. Type of Contract.

1. Project will be constructed under a single prime contract.

1.4 ACCESS TO SITE

A. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, visitors and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

    a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
    b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.5 COORDINATION WITH USERS

A. Owner Occupancy: Owner will not occupy the site during the entire construction period. Maintain existing exits unless otherwise indicated.
    1. Notify Owner not less than 72 hours in advance of activities that will affect Owner's ability to access the site.

1.6 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

    1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work to normal business working hours of 7 a.m. to 5 p.m., Monday through Friday, unless otherwise indicated. The Egremont Free Library is in a residential neighborhood. Noisy operations should not take place before 8 AM.

1.7 MISCELLANEOUS PROVISIONS

A. The Contractor, by submitting a Bid, acknowledges that he/she has visited the site and is fully aware of the scope of work of this contract.

B. Quantities shown on the construction documents are estimates to guide in defining the scope of work. The Contractor is responsible for calculating exact quantities, based on a thorough evaluation of the structures and scope of work, and submitting a complete cost proposal.

C. No additional payments will be made for work required to complete the scope of work identified in these documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01100

SECTION 01230
ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. One: All work included in the removal of the existing carpet and the installation

of new carpet.

B. Alternate No. Two: All work included in the removal of existing fire alarm system devices and the installation of a new fire alarm system as indicated on the drawings.

C. Alternate No. Three: All work included in the removal of existing lighting and the installation of a new lighting as indicated on the drawings.

END OF SECTION 01230

SECTION 01270

UNIT PRICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for unit prices.

1.2 DEFINITIONS

A. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.3 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 SCHEDULE OF UNIT PRICES

A. Unit Price No. One – Repointing stone foundation.
   1. Description: Repointing of stone exterior foundation according to Section 04926 “Stone Repointing".
   2. Unit of Measurement: Square Foot.

B. Unit Price No. Two – Replacement of timber sill.
   1. Description: Replace deteriorated timber sill in-kind including labor and materials.
   2. Unit of Measurement: Linear Foot.

C. Unit Price No. Three – Replacement of first floor timber joists.
   1. Description: Replace deteriorated first floor joists in-kind including labor and materials.
   2. Unit of Measurement: Linear Foot.

END OF SECTION 01270

SECTION 01300

SUBMITTAL, PRODUCTS, SUBSTITUTIONS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Work of this Section shall be governed by the Contract Documents. Provide materials and services necessary to furnish and deliver the work of this Section as specified herein, and/or as required by job conditions.

1.2 SHOP DRAWINGS AND PRODUCT DATA

A. Definitions

1. Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or any Subcontractor, Manufacturer, Supplier or Distributor to illustrate some portion of the work.
2. Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate a material, product or system for some portion of the work.
3. Samples are physical examples which illustrate materials, equipment or workmanship and establish standards by which the work will be judged. See Schedule of Samples under each Section of the Specifications.

B. The Contractor shall review, approve and submit, within seven (7) days after receipt thereof and in such sequence as to cause no delay in the Work or in the Work of the Owner or any separate contractor, all Shop Drawings, Product Data, Samples and Certificates required by the Contract Documents.

C. By approving and submitting Shop Drawings, Product Data Samples, the Contractor represents that he has determined and verified all materials, field measurements, and field construction criteria related thereto, or will do so, and that he has checked and coordinated with information contained within such submittal with the requirements of the Work of the Contract Documents.

D. The Contractor shall "not be relieved of responsibility" for any deviation from the requirements of the Contract Documents by the Engineers review of Shop Drawings, Product Data or Samples unless the Contractor has specifically informed the Engineer in writing of such deviation at the time of submission and the Engineer has given written notice to the specific deviation. The Contractor shall not be relieved from responsibility for errors or omissions in the Shop

Drawings, Product Data or Samples by the Engineer's review thereof Contract Documents indicate the work to be performed.

E. The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data or Samples to revisions other than those requested by the Engineer on previous submittal.

F. No portion of the Work requiring submission of a Shop Drawing, Product Data or Samples shall be commenced until the submittal has been reviewed by the Engineer. All such portions of the Work shall be in accordance with reviewed submittal.

1.3 SUBMISSION PROCEDURES

A. After the date specified for commencement of work the Contractor, within a mutually agreed to time with Engineer and Owner, -shall submit a shop Drawing Schedule to the Engineer, This schedule shall be broken down into the various items of work and shall list a "Begin" date and a "Complete" date for Shop Drawing Submission.

B. Submit to the Engineer Shop Drawings, Product Data and Samples in sufficient time to allow at least fifteen **(15)** working days for review. Submittal **shall be** checked and signed **by** the Contractor prior to submission to indicate that the Contractor has coordinated the work and that it conforms to the Contract Documents.

C. When catalog cuts, brochures, product data or other printed data are sent to the Engineer for review, a minimum of four **(4)** copies **of** each shall **be** submitted.

D. The quantities and types of samples are listed in each Section of the Specifications.

E. Each Shop Drawing shall contain a title block with provisions for the following:
1. Number and title of drawing.
2. Date of drawing and revision
3. Name of project building or facility.
4. Name of Contractor or Subcontractor submitting drawing.
5. Specification Section title and number,
6. Space for Engineer's stamp and received stamps (51lx5l').

F. Each Shop Drawing shall have listed on it all contract reference drawing numbers plus shop drawing numbers on related work by other Subcontractors if available. The Engineer's drawings may not be reproduced and submitted as Shop Drawings, unless consent is obtained from the Engineer in writing prior to such use.

G. Each Shop Drawing submission shall have indicated on the Drawing a submission number (whether first, second, third, etc.) and each submission after the first submission shall be clear of all previous stamps.

H. Shop Drawings for work of one trade shall be checked by Subcontractors of related trades if available, and shall have received their stamp of approval, before being submitted to the Engineer.

I. Shop Drawings which involve change or variances with Contract Documents shall be so noted by the Contractor, and the Owner and Engineer shall be advised in writing of the recommended change and reasons for such changes.

1.3 ENGINEER'S ACTION

A. After the completion of his checking, the Engineer will return the (2) two copies of shop drawings to Contractor marked in one of the following ways. As explained below.

With notation as follows:

corrections or comments made on the shop drawings during this review do not relieve contractor from compliance with requirements of the drawings and specifications. This check is only for review of general conformance with the design concept of the project and general compliance with the information given in the Contract Documents, The Contractor is responsible for confirming and correlating all quantities and dimensions- selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades-, and performing his work in a safe and satisfactory manner.

B. EXPLANATION OF COMMENTS

1. No Exceptions Taken: No corrections, contractor may proceed with the work; only these drawings should be used for fabrication and in the field.
2. Comment Attached, Resubmit: minor amount of corrections; all items can be fabricated in accordance with notes; review is completed; record copy incorporating the minor changes, must be submitted and shall not be considered as a re-submission.
3. Rejected: Drawings and/or catalogs are rejected as not in accordance with design concept of the project and information given in the contract documents.
4. Remarks: See note on shop drawings review stamp. Changes in shop drawings, other than those noted by Engineer shall be brought to Engineer's attention in writing.

C. Shop Drawings that are returned: "Revise and Resubmit" or "Rejected" shall be corrected and resubmitted to the **Engineer** promptly.

D. The review of a specific item shall not imply review of an entire assembly of which the item is a component unless the whole assembly is submitted and approved.

E. Engineer may withhold review on any Shop Drawing until Shop Drawings indicating all related items have been submitted. Submit (and Resubmit) Shop Drawings for such related items as approximately the same date to permit coordinating checking,

1.4 SAMPLES

A. Submit for review, to the Engineer, samples of materials listed under each Section of the Specification. Samples shall be properly labeled for identification, consisting of the following information-. Job Titles, Sample No, and Submission No.

B. Do not commence work under Sections of the Specifications until the Engineer's review in writing is obtained for all listed samples.

C. Do not construe review of advance samples as total guarantee of acceptance of materials. Materials will be submitted to field inspections, from time to time, as work progresses.

D. Samples of Specific manufactured product shall be accomplished with appropriate manufacturers literature at time of submission.

1.5 PROGRESS SCHEDULE

A. The Contractor shall prepare a construction schedule in a form acceptable to the Engineer and Owner within two (2) weeks from the execution date of the Contract for the Engineer's and Owner approval.

B. The progress schedule shall be in the form of a network schedule chart.

C. The progress schedule shall be updated at least once a month or more frequently, if necessary, should the Project be faced with the threat of delay for any reason. Should changes that have occurred since previous submission of updated schedule, indicate progress of activity, show completion dates.

D. Furnish the Engineer and the Owner with sufficient copies of the original schedules and all updated schedules as the Owner or Engineer may require.

E. After approval of the schedule, the Contractor shall be responsible for seeing that it is adhered to, and for ascertaining that proper coordination is maintained between all work of the Contract.

1.6 SCHEDULE OF VALUES

A. The Contractor shall submit to the Engineer and Owner a Schedule of Values, on form supplied by Owner, at least ten (10) days prior to submitting the first application for payment

B. The Schedule of Values shall list the breakdown of the work generally following the Table of Contents of this Specification, with identification of project, issue date, Contractors name and address.

C. Each item shall be accompanied by a dollar value rounded off to the nearest ten dollars. As requested by the Engineer support values given with data that will substantiate their correctness.

D. The use of the Schedule of Values shall be only as a basis for Contractor's Application for Payment.

E. Sum total of all costs of items listed in the Schedule shall be equal to the total contract sum.

F. The Schedule of Values shall be submitted each month along with the Application for the payment.

1.7 MATERIAL AND EQUIPMENT LIST

A. Within appropriate time after the date of award of the Contract, the Contractor shall submit for approval a complete list of suppliers, materials and equipment proposed for use in connection with the Project.

B. After a material piece of equipment has been approved, no change in brand or make will be permitted unless satisfactory written evidence is presented and approved by the Engineer that the manufacturer cannot make scheduled delivery of approved material, or that material delivered has been rejected and the substitution of a suitable material is an urgent necessity, or that other conditions have become apparent which indicate that the approval of such other material is in the best interest of the Owner.

1.8 PRODUCT ACCEPTANCE STANDARDS

A. Where the words "or and acceptable equal" or other synonymous terms are used, it is expressly understood that they shall mean that the acceptance of any such submission is vested in the Engineer, whose decision shall be final and binding upon all concerned. All submissions are subject to such review.

B. The intent of this article is to encourage and permit competition on qualified products by reputable and qualified Contractors, suppliers and manufacturers, whose product, reputation and performance warrant review for the conditions, intent of design and performance considerations.

C. When descriptive catalog designations including manufacturers name, product brand name, or model number are referred to in the Contract Documents, such designations shall be considered as being those found in industry publications of current issue at date of first invitation to bid.

D. When standards of the Federal Government, Trade Societies, or Trade Associations are referred to in the Contract Documents by specific date of issue, these shall be considered a part of this contract. When such references do not bear a date of issue, the current published edition at date of first invitation to bid shall be considered as part of this contract, Suppliers need not be a member of such trade societies or associations referred to in the Specifications.

E. Whenever any product is specified or shown by describing proprietary items, model numbers, catalog numbers, manufacturer, trade names or similar reference, the bidder obligates himself to submit proposals and accepts awards of contract based upon the use of such products. Use of such reference is intended to establish the measure of quality which the Engineer has determined as requisite and necessary for this project, Where two or more products are. chosen or specified, the bidder has his option of which to use, provided the product used meets all requirements of specifications and design criteria. The right is reserved to review proposed deviations of design, function, construction or similar differences which will effect the design intent

1.9 SUBSTITUTIONS

A. Requests for substitution will NOT be considered prior to Bid.

B. After the Contract has been executed, the Engineer will consider a formal request for the substitution of products in place of those specified under the following conditions:

1. The request is accompanied by complete data an the proposed substitution substantiating compliance with the Contract Documents including product identification and description, performance and test data, references and samples where applicable, and an itemized comparison of the proposed substitution with the products specified or named by addenda, with data relating to Contract time schedule, design and artistic effect where applicable.
2. The request is accompanied by accurate cost data on the proposed, substitution in comparison with the product specified, whether or not modification of the Contract Sum is to be a consideration.

C. Requests for substitution based on paragraph (1) above, when forwarded by the Contractor to the Engineer and Owner, are understood to mean that the Contractor.

1. Represents that he has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified.
2. Will provide the same guarantee for the substitution that he would for that specified.
3. Certified that the cost data presented is complete and Includes all related costs under this contract, and that he waives all claims for additional costs related to thin substitution which subsequently become apparent and
4. Will coordinate the installation of the accepted substitute, making such changes as may be required for the work to be complete in all respects, at no additional cost to the Owner and at no extension of the contract completion date.

D. Substitutions will not be considered if:

1. They are indicated or implied on shop drawings submissions without the formal request required in paragraph (1) above; or
2. for their implementation they require a substantial revision of the Contract Documents in order to accommodate their use,

END OF SECTION 01300

SECTION 01351

SPECIAL PROCEDURES FOR HISTORIC TREATMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general protection and treatment procedures for the entire Project and the following specific work:

1. Repair and replacement of historic fabric.

1.2 DEFINITIONS

A. Consolidate: To strengthen loose or deteriorated materials in place.

B. Dismantle: To disassemble and detach items by hand from existing construction to the limits indicated, using small hand tools and small one-hand power tools, so as to protect nearby historic surfaces; and legally dispose of dismantled items off-site, unless indicated to be salvaged or reinstalled.

C. Existing to Remain: Existing items that are not to be removed or dismantled.

D. Historic: Spaces, areas, rooms, surfaces, materials, finishes, and overall appearance which are important to the successful preservation and reconstruction as determined by the Architect. Designated historic areas and surfaces are generally described below.
   1. Rehabilitation Zones (Building Exterior): Areas of significant architectural importance, integrity, and visibility; to be preserved and restored consistent with the remaining historic fabric and to the extent shown on Drawings:

E. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by the Architect.

F. Reconstruct: To remove existing item, replicate damaged or missing components, and reinstall in original position.

G. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.

H. Reinstall: To protect removed or dismantled item, repair and clean it as indicated for reuse, and reinstall it in original position, or where indicated.

I. Remove: Specifically for historic spaces, areas, rooms, and surfaces, the term means to detach an item from existing construction to the limits indicated, using hand tools and hand-operated power equipment, and legally dispose of it off-site, unless indicated to be salvaged or reinstalled.

J. Repair: To correct damage and defects, retaining existing materials, features, and finishes while employing as little new material as possible. Includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.

K. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.

L. Replicate: To reproduce in exact detail, materials, and finish, unless otherwise indicated.

M. Reproduce: To fabricate a new item, accurate in detail to the original, and in either the same or a similar material as the original, unless otherwise indicated.

N. Restore: To consolidate, replicate, reproduce, repair, and refinish as required to achieve the indicated results.

O. Retain: To keep existing items that are not to be removed or dismantled.

P. Reversible: New construction work, treatments, or processes that can be removed or undone in the future without damaging historic materials, unless otherwise indicated.

Q. Salvage: To protect removed or dismantled items and deliver them to Owner.

R. Stabilize: To provide structural reinforcement of unsafe or deteriorated items while maintaining the essential form as it exists at present; also, to reestablish a weather-resistant enclosure.

S. Strip: To remove existing finish down to base material, unless otherwise indicated.

1.3 QUALITY ASSURANCE

A. Historic Treatment Specialist Qualifications: An experienced firm regularly engaged in historic treatments similar in nature, materials, design, and extent to this work as specified in each section, and that has completed a minimum of five recent projects with a record of successful in-service performance that demonstrate the firm's qualifications to perform this work.

1. Field Supervisor Qualifications: Full-time supervisors experienced in historic treatment work similar in nature, material, design, and extent to that indicated for this Project. Supervisors shall be on Project site during times that historic treatment work is in progress. Supervisors shall not be changed during Project except for causes beyond the control of the specialist firm.

2. Worker Qualification: Persons who are experienced in historic treatment work of types they will be performing.

B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning removal and dismantling work. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Standards: Comply with ANSI/ASSE A10.6.

D. Historic Treatment Preconstruction Conference: Conduct conference at Project site.

1.4 STORAGE AND PROTECTION OF HISTORIC MATERIALS

A. Salvaged Historic Materials:

1. Clean only loose debris from salvaged historic items unless more extensive cleaning is indicated.
2. Pack or crate items after cleaning; cushion against damage during handling. Label contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area on-site.
5. Protect items from damage during transport and storage.

B. Historic Materials for Reinstallation:

1. Repair and clean historic items as indicated and to functional condition for reuse.
2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label 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 unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make item functional for use indicated.

C. Existing Historic Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Architect, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after historic treatment and construction work in the vicinity is complete.

D. Storage and Protection: When taken from their existing locations, catalog and store historic items within a weathertight enclosure where they are protected from wetting by rain, snow, condensation, or ground water, and from freezing temperatures.

1. Identify each item with a nonpermanent mark to document its original location. Indicate original locations on plans elevations, sections, or photographs by annotating the identifying marks.
2. Secure stored materials to protect from theft.

1.5 PROJECT CONDITIONS

A. Owner will occupy portions of building immediately adjacent to removal and dismantling area. Conduct removal and dismantling work so Owner's operations will not be disrupted.

B. Hazardous Materials: Hazardous materials are present in construction affected by removal and dismantling work. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.

1. Hazardous material remediation is specified elsewhere in the Contract Documents.
2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.

C. Storage or sale of removed or dismantled items on-site is not permitted unless otherwise indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Preparation for Removal and Dismantling: Examine construction to be removed or dismantled to determine best methods to safely and effectively perform removal and dismantling work. Examine adjacent work to determine what protective measures will be necessary. Make explorations, probes, and inquiries as necessary to determine condition of construction to be removed or dismantled and location of utilities and services to remain that may be hidden by construction that is to be removed or dismantled.

1. Verify that affected utilities have been disconnected and capped.
2. Inventory and record the condition of items to be removed and dismantled for reinstallation or salvage.
3. Before removal or dismantling of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.
4. Engage a professional engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures as a result of removal and dismantling work.

3.2 PROTECTION, GENERAL

A. Ensure that supervisory personnel are on-site and on duty when historic treatment work begins and during its progress.

B. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from historic treatment procedures.

1. Use only proven protection methods, appropriate to each area and surface being protected.
2. Provide barricades, barriers, and temporary directional signage to exclude public from areas where historic treatment work is being performed.
3. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of historic treatment work.
4. Contain dust and debris generated by removal and dismantling work and prevent it from reaching the public or adjacent surfaces.
5. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
6. Protect floors and other surfaces along haul routes from damage, wear, and staining.

C. Temporary Protection of Historic Materials:

1. Protect existing historic materials with temporary protections and construction. Do not deface or remove existing materials.
2. Do not attach temporary protection to historic surfaces except as indicated as part of the historic treatment program and approved by Architect.

D. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.

E. Utility and Communications Services:

1. Notify the Owner, Architect, and authorities having jurisdiction, owning or controlling wires, conduits, pipes, and other services affected by the historic treatment work before commencing operations.
2. Disconnect and cap pipes and services as required by authorities having jurisdiction, as required for the historic treatment work.
3. Maintain existing services unless otherwise indicated; keep in service, and protect against damage during operations. Provide temporary services during interruptions to existing utilities.

F. Existing Drains: Prior to the start of work in an area, test drainage system to ensure that it is functioning properly. Notify Architect immediately of inadequate drainage or blockage. Do not begin work in an area until the drainage system is in working order.

1. Prevent solids such as stone or mortar residue from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from historic treatment work.
2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.

3.3 PROTECTION DURING APPLICATION OF CHEMICALS

A. Protect motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm or damage resulting from applications of chemical cleaners and paint removers.

B. Cover adjacent surfaces with protective materials that are proven to resist chemicals selected for Project unless chemicals being used will not damage adjacent surfaces as indicated in historic treatment program. Use covering materials and masking agents that are waterproof, UV-resistant, and will not stain or leave residue on surfaces to which they are applied. Apply protective materials according to manufacturer's written instructions. Do not apply liquid masking agents or adhesives to painted or porous surfaces. When no longer needed, promptly remove protective materials staining.

C. Do not apply chemicals during winds of sufficient force to spread them to unprotected surfaces.

D. Neutralize and collect alkaline and acid wastes and legally dispose of off Owner's property.

E. Collect and dispose of runoff from chemical operations by legal means and in a manner that prevents soil contamination, soil erosion, undermining of paving and foundations, damage to landscaping, or water penetration into building interior.

3.4 PROTECTION FROM FIRE

A. General: Follow fire-prevention plan and the following.

1. Comply with NFPA 241 requirements unless otherwise indicated.
2. Remove and keep area free of combustibles including, rubbish, paper, waste, and chemicals, except to the degree necessary for the immediate work.

    a. If combustible material cannot be removed, provide fire blankets to cover such materials.

3. Prohibit smoking by all persons within the Project work and staging areas.

B. Heat-Generating Equipment and Combustible Materials: Comply with the following procedures while performing work with heat-generating equipment or highly combustible materials, including welding, torch-cutting, soldering, brazing, paint removal with heat,

or other operations where open flames or implements utilizing high heat or combustible solvents and chemicals are anticipated.

1. Obtain Owner's approval for operations involving use of open-flame or welding or other high-heat equipment. Notify Owner before each occurrence, indicating location of such work.
2. As far as practical, restrict heat-generating equipment to shop areas or outside the building.
3. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.
4. Use fireproof baffles to prevent flames, sparks, hot gasses, or other high-temperature material from reaching surrounding combustible material.
5. Prevent the spread of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.

C. Fire Extinguishers, Fire Blankets, and Rag Buckets: Maintain fire extinguishers, fire blankets, and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for the type of fire risk in each work area. Ensure that nearby personnel and the fire watch are trained in fire-extinguisher and blanket operation.

3.5 GENERAL HISTORIC TREATMENT

A. Ensure that supervisory personnel are present when historic treatment work begins and during its progress.

B. Halt the process of deterioration and stabilize conditions, unless otherwise indicated. Perform work as indicated on Drawings. Follow the procedures in subparagraphs below and procedures approved in historic treatment program.

1. Retain as much existing material as possible; repair and consolidate rather than replace.
2. Use additional material or structure to reinforce, strengthen, prop, tie, and support existing material or structure.
3. Use reversible processes wherever possible.
4. Use historically accurate repair and replacement materials and techniques unless otherwise indicated.

C. Notify Architect of visible changes in the integrity of material or components whether due to environmental causes including biological attack, UV degradation, freezing, or thawing; or due to structural defects including cracks, movement, or distortion.

1. Do not proceed with the work in question until directed by Architect.

D. Where missing features are indicated to be repaired or replaced, provide features whose designs are based on accurate duplications rather than on conjectural designs, subject to the approval of Architect.

E. Where Work requires existing features to be removed or dismantled and reinstalled, perform these operations without damage to the material itself, to adjacent materials, or to the substrate.

F. Identify new and replacement materials and features with permanent marks hidden in the completed work to distinguish them from original materials. Record a legend of identification marks and the locations of the items on Record Drawings.

3.6 HISTORIC REMOVAL AND DISMANTLING

A. General: Have removal and dismantling work performed by a qualified historic treatment specialist.

B. Perform work in accordance with the historic treatment program.

C. Water-Mist Sprinkling: Use water-mist sprinkling and other wet methods to control dust only with adequate, approved procedures and equipment that ensure that such water will not create a hazard or adversely affect other building areas or materials.

D. Anchorages:

1. Remove anchorages associated with removed items.
2. Dismantle anchorages associated with dismantled items.
3. In non-historic surfaces, patch holes created by anchorage removal or dismantling in accordance with the requirements for new work.
4. In historic surfaces, patch or repair holes created by anchorage removal or dismantling in accordance with Section specific to the historic surface being patched.

END OF SECTION 01351

SECTION 01781

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

This Section includes administrative and procedural requirements for Project Record Drawings.

1.2 SUBMITTALS

Record Drawings: Comply with the following:

A. Number of Copies: Submit copies of Record Drawings as follows:

B. Initial Submittal: Submit one (1) set of marked-up Record Prints. Architect will initial and date each print and mark whether general scope of changes, additional information recorded, and quality of drafting are acceptable. Architect will return prints for revisions, organizing into sets, printing, binding, and final submittal.

C. Final Submittal: Submit one (1) set of revised Record Prints.

PART 2 – PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.

B. Preparation: Mark Record Prints to show the actual installation. Require individual or entity who obtained record data, whether individual or entity is installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

1. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.

2. Accurately record information in an understandable drawing technique.

3. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

C. Content: Types of items requiring marking include, but are not limited to, the following:

1. Dimensional ties from underground utilities to permanent objects found on the original drawings and in the field.

2. Locations and depths of underground utilities.

3. Routing of piping and conduits.

4. Changes made by Change Order or Construction Change Directive.

5. Details not on the original Contract Drawings.

6. Field records for variable and concealed conditions.

7. Record information on the Work that is shown only schematically.

D. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.

E. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.

F. Mark important additional information that was either shown schematically or omitted from original Drawings.

G. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

END OF SECTION

SECTION 02070

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section requires the selective removal and subsequent offsite disposal of all items on the contract drawings as required to complete the work.

1.2 SUBMITTALS

A. Submit schedule indicating proposed sequence of operations for selective demolition work to the Owner for review prior to start of work.

B. Take photographs of existing conditions of building surfaces, equipment, and adjacent improvements that might be misconstrued as damage related to the removal operations. File with the Owner prior to start of work.

1.3 JOB CONDITIONS

A. Occupancy: The units will be occupied during this project. Conditions satisfactory to the building tenants and the Owner must be maintained throughout the work.

B. Condition of Structures: Owner assumes no responsibility for actual condition of items or structures to be demolished.

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

C. Partial Demolition and Removal: Items indicated to be removed, but not salvaged but of salvageable value to the Contractor may be removed as the work progresses. Transport salvaged items from site as they are removed.

1. Extended storage or sale of removed items on site will not be permitted.

D. Protections: Provide temporary barricades and other forms of protection to protect building tenants and the general public from injury due to selective demolition work.

1. Provide protective measures as required to provide free and safe passage of building tenants and the general public to the occupied portions of the buildings.

2. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of any element to be demolished and adjacent facilities or work to remain.

3. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.

4. Remove protections at completion of the work.

E. Damages: Promptly repair damages caused to adjacent facilities by demolition work

F. Traffic: Conduct selective demolition operations and debris removal to ensure minimum interference with roads, streets, walks, or other occupied or used facilities.

1. Do not close, block, or otherwise obstruct streets, walks, or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

G. Utility Services: Maintain existing utilities indicated to remain in service and protect them against damage during demolition operations.

H. Environmental Controls: Use water sprinkling, temporary enclosures, and other methods to limit dust and dirt migration. Comply with governing regulations pertaining to environmental protection.

1. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 PREPARATION

A. General:

1. Cease operations and notify the Engineer immediately if safety of the structure appears to be endangered. Take precautions to support structure until determination is made as to continuing operations.

2. Locate, identify, stub off, and disconnect utility services that are to be removed.

3.2 DEMOLITION

A. General: Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on the Contract Drawings in accordance with governing regulations.

3.3 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove from the building site, all debris, rubbish, and other materials resulting from demolition operations, on a daily basis. Transport and legally dispose off site.

1. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.

2. Burning of removed materials is not permitted on the project site.

3.4 CLEANUP AND REPAIR

A. General: Upon completion of demolition work, remove tools, equipment, and demolished materials from site. Remove protections and leave interior areas broom clean. Return elements of construction and surfaces to remain too a condition existing prior to the start of operations. Repair adjacent construction or surfaces soiled or damaged by the selective demolition work.

END OF SECTION 02070

SECTION 02220

GENERAL GUIDELINES FOR CUTTING AND PATCHING ORIGINAL WORK

PART 1 - GENERAL

1.01 SUMMARY

A. This procedure includes general guidelines to follow when performing cutting and patching original work.

1.02 DEFINITIONS

A. "Cutting and patching" includes cutting into existing construction to provide for the installation or performance of other work and subsequent fitting and patching required to restore surfaces to their original condition.

1. Cutting and patching is performed for coordination of the work, to uncover work for access or inspection, to obtain samples for testing, to permit alterations to be performed or for other similar purposes.

2. Cutting and patching performed during the manufacture of products, or during the initial fabrication, erection or installation processes is not considered to be "cutting and patching" under this definition. Drilling of holes to install fasteners and similar operations are also not considered to be "cutting and patching".

3. "Selective Demolition" is recognized as related-but-separate category of work, which may or may not require cutting and patching as defined in this procedure.

l.03 SUBMITTALS

A. Procedural Proposal for Cutting and Patching: Where prior approval of cutting and patching is required, submit proposed procedures for this work well in advance of the time work will be performed and request approval to proceed. Include the following information, as applicable, in the submittal:

l. Describe nature of the work and how it is to be performed, indicating why cutting and patching cannot be avoided. Describe anticipated results of the work in terms of changes to existing work, including structural, operational and visual changes as well as other significant elements.

2. List products to be used and firms, including qualifications, that will perform work.

3. Give dates when work is expected to be performed.

4. List utilities that will be disturbed or otherwise be affected by work, including those that will be relocated and those that will be out-of-service temporarily. Indicate how long utility service will be disrupted.

5. When cutting and patching of structural work involves the addition of reinforcement, submit details and engineering calculations to show how that reinforcement is integrated with original structure to satisfy requirements.

6. All welding and/or hotwork requires formal notification to the Owner no later than the first thing in the morning of each day such work is to be done. No welding or hot work is permitted without such prior notification.

1.04 QUALITY ASSURANCE

A. General Contractor shall do all cutting and patching of wall surface for the removal, relocation of or new piping, conduit, electrical boxes, where pipes have been removed or abandoned.

B. Requirements for Structural Work: Do not cut and patch structural work in a manner that would result in a reduction of load-carrying capacity or of load-deflection ratio. Prior to such work, obtain approval of project's Structural Engineer.

C. Before cutting and patching the following categories of work, obtain the Owner’s or Owner’s Representative’s approval to proceed.

1. Structural steel.
2. Miscellaneous structural metals, including lintels, equipment supports, stair systems and similar categories of work.
3. Structural concrete.
4. Foundation construction.
5. Timber and primary wood framing.
6. Structural decking.
7. Bearing and retaining walls.
8. Piping, ductwork, vessels and equipment.
9. Shoring, bracing, and sheeting.
10. Primary operational systems and equipment.
11. Water/moisture/vapor/air/smoke barriers, membranes and flashings.

l2. Noise and vibration control elements and systems.
l3. Control, communication, conveying, and electrical wiring systems.

D. Visual Requirements: Do not cut and patch work exposed on the building's exterior or in its occupied spaces, in a manner that would, in the Owner's Representative's opinion, result in lessening the building's aesthetic qualities. Do not cut and patch work in a manner that would result in substantial visual evidence of cut and patch work. Remove and replace work judged by the Owner's Representative to be cut and patched in a visually unsatisfactory manner.

E. Retain a recognized experienced and specialized firm to cut and patch the following categories of exposed work.

1. Processed concrete finishes.
2. Stonework and stone masonry.
3. Ornamental metal.
4. Matched-veneer woodwork.
5. Roofing.

PART 2 - PRODUCTS

2.0l MATERIALS

A. General: Except as otherwise indicated, or as directed by the Owner's Representative, use materials for cutting and patching that are identical to existing materials. If identical materials are not available, or cannot be used, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials for cutting and patching that will result in equal-or-better performance characteristics.

l. The use of a trade name and suppliers name and address is to indicate a possible source of the product. Products of the same type from other sources shall not be excluded provided they possess like physical and functional characteristics.

PART 3 - EXECUTION

3.0l EXAMINATION

A. Before cutting, examine the surfaces to be cut and patched and the conditions under which the work is to be performed. If unsafe or otherwise unsatisfactory conditions are encountered, take corrective action before proceeding with the work.

1. Before the start of cutting work, meet at the work site with all parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict between the various trades. Coordinate layout of the work and resolve potential conflicts before proceeding with the work.

3.02 PREPARATION

A. Temporary Support: To prevent failure provide temporary support of work to be cut. Do not endanger other work. Provide adequate protection of other work during cutting and patching, to prevent damage; and provide protection of the work from adverse weather exposure.

B. Protection: Protect other work during cutting and patching to prevent damage. Provide protection from adverse weather conditions of that part of the project that may be exposed during cutting and patching operations.

l. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

3.03 ERECTION, INSTALLATION, APPLICATION

A. General: Employ skilled workers to perform cutting and patching work. Except as otherwise indicated or as approved by the Owner's Representative, proceed with cutting and patching at the earliest feasible time and complete work without delay.

B. Cutting: Cut the work using methods that are least likely to damage work to be retained or adjoining work.

l. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut through concrete and masonry using a cutting machine such as a Carborundum saw or core drill to insure a neat hole.

2. Cut holes and slots neatly to size required with minimum disturbance of adjacent work. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces. Temporarily cover openings when not in use.

3. Comply with other applicable requirements where cutting and patching requires excavating and backfilling.

4. By-pass utility services such as pipe and conduit, before cutting, where such utility services are shown or required to be

removed, relocated or abandoned. Cut-off conduit and pipe in walls or partitions to be removed. After by-pass and cutting, cap, valve or plug and seal tight remaining portion of pipe and conduit to prevent entrance of moisture or other foreign matter.

C. Patching: Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work.

l. Where feasible, inspect and test patched areas to demonstrate integrity of work.

2. Restore exposed finishes of patched areas and where necessary extend finish restoration into retained adjoining work in a manner which will eliminate evidence of patching and refinishing. Where patch occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing patch, after patched area has received prime and base coats.

3. Where removal of walls or partitions extends one finished area into another finished area, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. If necessary to achieve uniform color and appearance, remove existing floor and wall coverings and replace with new materials.

a. Where patch occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing patch, after patched area has received prime and base coat.

4. Patch, repair or rehang existing ceilings as necessary to provide an even plane surface of uniform appearance.

D. Exterior Trim and Finish Work:

1. Only deteriorated sections of material shall be removed and replaced.

2. New material shall be joined to the existing with a lapped scarf joint. The angle of the scarf joint shall be oriented so that if moisture should enter into the joint, it will run towards the outside.

3.04 ADJUSTING/CLEANING

A. Thoroughly clean areas and adjacent spaces soiled due to the work performed or used as access to work. Remove completely paint, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION

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SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement.

1.3 INFORMATIONAL SUBMITTALS

A. Material certificates.

B. Material test reports.

1.4 QUALITY ASSURANCE

A. 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. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

C. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.

2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

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

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

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
   1. Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M, epoxy coated, with less than 2 percent damaged coating in each 12-inch bar length.

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.

C. Adhesive Anchor Systems: Epoxy coated reinforcing bars to be drilled and grouted into existing masonry or concrete where indicated.

D. Mechanical Couplers: use the following mechanical couplers, or approved equal, for the corresponding steel reinforcing bar size.

   1. Dayton Superior BarLock® Coupler System
   2. LENTON® LOCK B-Series Mechanical Rebar Splicing System

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.
      b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33, graded.

1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M.

2.4 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

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. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.5 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

1. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.6 CONCRETE MIXTURES

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.

B. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 20 percent.

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

1. Use 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.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

D. Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3500 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.45.
3. Slump Limit: 5 inches for concrete with verified slump of 2 to 4 inches before adding plasticizing admixture, 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.

2.7 FABRICATING REINFORCEMENT

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

2.8 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

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, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Chamfer exterior corners and edges of permanently exposed concrete.

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.

3.3 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

3.4 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. 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. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

C. Cold-Weather Placement: Comply with ACI 306.1.

D. Hot-Weather Placement: Comply with ACI 301.

3.5 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.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.6 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 manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. 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.
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.
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.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a 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. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.7 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.

3.8 FIELD QUALITY CONTROL

A. Notify architect of record a minimum of 48 hours prior to slab-on-grade placement for inspection of steel reinforcing.

1. Steel Reinforcement Placement: The Contractor shall anticipate one (1) inspection of the steel reinforcing throughout the project.

    a. One (1) for footings and concrete foundation repair.

B. When architect reports that steel reinforcing does not comply with approved shop drawings, slab placement shall not begin until reinforcing complies with approved shop drawings.

C. Testing and Inspecting: Contractor will engage a qualified testing and inspecting agency to perform field tests and prepare test reports.

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

    a. The Contractor shall anticipate one (1) test on concrete for slump, air content, and compressive strength.

2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

4. Compressive-Strength Tests: ASTM C 39; test one field cured cylinder at 7 days and one cylinder at 28 days.
5. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
6. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. The costs associated with additional testing will not be considered for additional payment.

END OF SECTION 03300

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SECTION 04816

CONCRETE UNIT MASONRY ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete masonry units (CMU's).

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 INFORMATIONAL SUBMITTALS

A. Mix Designs: For each type of grout. Include description of type and proportions of ingredients.

1.4 QUALITY ASSURANCE

A. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

1.5 PROJECT CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

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

PART 2 - PRODUCTS

2.1 GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction.

B. Aggregate for Grout: ASTM C 404.

C. Water: Potable.

2.2 GROUT MIXES

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

1. Do not use calcium chloride in grout.

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

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
2. Proportion grout to for a 2000 psi compressive strength.
3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 LAYING MASONRY WALLS

A. Fill cores in hollow CMUs with grout as indicated.

3.2 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.

B. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

3.3 MASONRY WASTE DISPOSAL

A. Excess Masonry Waste: Remove excess clean masonry waste and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04816

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SECTION 04926

STONE REPOINTING

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:

1. Repointing joints with mortar.

1.3 UNIT PRICES

A. Work of this Section is affected by unit prices specified in Section 01270 "Unit Prices."

1. Unit prices apply to authorized work covered by quantity allowances.
2. Unit prices apply to additions to and deletions from Work as authorized by Change Orders.

1.4 DEFINITIONS

A. Low-Pressure Spray: 100 to 400 psi; 4 to 6 gpm.

B. Rift: The most pronounced direction of splitting or cleavage of a stone.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to repointing stonework including, but not limited to, the following:

a. Verify stone repointing specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
b. Materials, material application, sequencing, tolerances, and required clearances.
c. Quality-control program.

1.7 SEQUENCING AND SCHEDULING

A. Order sand for pointing mortar immediately after approval of mockups. Take delivery of and store at Project site enough quantity to complete Project.

B. Work Sequence: Perform stone repointing work in the following sequence, which includes work specified in this and other Sections:

1. Remove plant growth.
2. Inspect masonry for open mortar joints and permanently or temporarily point them before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
3. Remove paint.
4. Clean stone.
5. Rake out mortar from joints surrounding stone to be replaced and from joints adjacent to stone repairs along joints.
6. Repair stonework, including replacing existing stone with new stone.
7. Rake out mortar from joints to be repointed.
8. Point mortar and sealant joints.
9. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.
10. Where water repellents are to be used on or near stonework, delay application of these chemicals until after pointing and cleaning.

1.8 ACTION SUBMITTALS

A. Product Data: For each type of product.
1. Include recommendations for product application and use. Include test data substantiating that products comply with requirements.

1.9 QUALITY ASSURANCE

A. Stone Repointing Specialist Qualifications: **Engage an experienced stone repointing firm to perform work of this Section. Firm shall have completed 3 historic projects similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance, in the last 7 years. Experience in only installing standard unit masonry or new stone masonry is insufficient experience for stone repointing work**.

1. Field Supervision: Stone repointing specialist firms shall maintain experienced full-time supervisors on Project site during times that stone repointing work is in progress.

B. Mockups: Prepare mockups of stone repointing to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Repointing: Rake out joints in two separate areas for each type of repointing required, and repoint one of the areas.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations

in writing.

3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver packaged materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.

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

C. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.

D. Store sand where grading and other required characteristics can be maintained and contamination avoided.

1.11 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit repointing work to be performed according to product manufacturers' written instructions and specified requirements.

B. Temperature Limits, General: Repoint mortar joints only when air temperature is between 40 and 90 deg F and is predicted to remain so for at least seven days after completion of the Work unless otherwise indicated.

C. Hot-Weather Requirements: Protect mortar-joint pointing when temperature and humidity Conditions produce excessive evaporation of water from mortar materials. Provide artificial shade and wind breaks, and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F and above unless otherwise indicated.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Source Limitations: Obtain each type of material for stone repointing (cement, sand, etc.) from single source with resources to provide materials of consistent quality in appearance and physical properties.

2.2 MORTAR MATERIALS

A. Mortar to be Type N for above grade use. Use Type S for below grade repointing.

B. Lime

C. Mortar Sand: ASTM C 144.

1. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend

several sands if necessary to achieve suitable match.

2. Color: Natural sand or ground marble, granite, or other sound stone of color necessary to produce required mortar color.

D. Portland Cement: Match existing mortar color.

E. Water: Potable.

2.3 MORTAR MIXES

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

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

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

C. Mixes: Mix mortar materials in the following proportions: 1 part Lime, 1 part Portland Cement, 6 parts sand.

PART 3 - EXECUTION

3.1 PROTECTION

A. Prevent mortar from staining face of surrounding stone and other surfaces.

1. Cover sills, ledges, and other projecting items to protect them from mortar droppings.
2. Keep wall area wet below pointing work to discourage mortar from adhering.
3. Immediately remove mortar splatters in contact with exposed stone and other surfaces.

3.2 STONE REPOINTING, GENERAL

A. Appearance Standard: Repointed surfaces are to have a uniform appearance as viewed from 20 feet away by Architect.

3.3 REPOINTING STONEWORK

A. Rake out and repoint joints to the following extent:

1. All joints in areas indicated.
2. Joints indicated as sealant-filled joints.
3. Joints at locations of the following defects:

a. Holes and missing mortar.
b. Cracks that can be penetrated 1/4 inch or more by a knife blade 0.027 inch thick.

c. Cracks 1/16 inch or more in width and of any depth.
d. Hollow-sounding joints when tapped by metal object.
e. Eroded surfaces 1/4 inch or more deep.
f. Deterioration to point that mortar can be easily removed by hand, without tools.
g. Joints filled with substances other than mortar.

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

C. Rake out joints as follows, according to procedures demonstrated in approved mockup:

1. Remove mortar from joints to depth of 2 1/2 times joint width, but not less than 1/2 inch or not less than that required to expose sound, unweathered mortar. Do not remove unsound mortar more than 2 ½ inches deep; consult Architect for direction.

2. Remove mortar from stone surfaces within raked-out joints to provide reveals with square backs and to expose stone for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.

3. Do not spall edges of stone units or widen joints. Replace or patch damaged stone units as directed by Architect.

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

E. Pointing with Mortar:

1. Rinse joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen joint surfaces before pointing.
2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch until a uniform depth is formed. Fully compact each layer, and allow it to become thumbprint hard before applying next layer.
3. After deep areas have been filled to same depth as remaining joints, point joints by placing mortar in layers not greater than 3/8 inch. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing stone has worn or rounded edges, slightly recess finished mortar surface below face of stone to avoid widened joint faces. Take care not to spread mortar beyond joint edges onto exposed stone surfaces or to featheredge the mortar.
4. When mortar is thumbprint hard, tool joints to match original appearance of joints as demonstrated in approved mockup. Remove excess mortar from edge of joint by brushing.
5. Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.
6. Hairline cracking within mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

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

3.4 FINAL CLEANING

A. After mortar has fully hardened, thoroughly clean exposed stone surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water, applied by low-pressure spray.

1. Do not use metal scrapers or brushes.
2. Do not use acidic or alkaline cleaners.

B. Clean adjacent nonstone surfaces. Use detergent and soft brushes or cloths.
and flush gutters and downspouts.

D. Remove masking materials, leaving no residues that could trap dirt.

3.5 FIELD QUALITY CONTROL

A. Notify Owner and Architect's Project representative in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until Owner and Architect's Project representatives have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

END OF SECTION 04926

SECTION 05520

PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel pipe and tube railings.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:
1. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ ft. applied in any direction.
b. Concentrated load of 200 lbf applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
b. Infill load and other loads need not be assumed to act concurrently.

2.2 METALS, GENERAL

A. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

1. Provide type of bracket with flange tapped for concealed anchorage to threaded hanger bolt and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

2.3 STEEL AND IRON

A. Tubing: ASTM A 500 (cold formed) or ASTM A 513.

B. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

1. Provide galvanized finish for exterior installations and where indicated.

C. Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.4 FASTENERS

A. General: Provide the following:
1. Hot-Dip Galvanized Railings: Type 304 stainless-steel or hot-dip zinc-coated steel fasteners complying with ASTM A 153/A 153M or ASTM F 2329 for zinc coating.

B. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.
1. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 2 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Shop Primers: Provide primers that comply with Section 09910 "Exterior Painting".

E. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

F. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

G. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

H. Epoxy Intermediate Coat: Complying with MPI #77 and compatible with primer and topcoat.

I. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.6 FABRICATION

A. 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.

B. Form work true to line and level with accurate angles and surfaces.

C. 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.

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 flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

D. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

E. Form changes in direction by bending or by inserting prefabricated elbow fittings.

F. For changes in direction made by bending, use 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.

G. Close exposed ends of railing members with prefabricated end fittings.

H. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated.

I. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

2.7 STEEL AND IRON FINISHES

A. Galvanized Railings:

1. Hot-dip galvanize exterior steel railings, including hardware, after fabrication.

B. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

C. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of

Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

D. High-Performance Coating: Apply epoxy intermediate and polyurethane topcoats to prime-coated surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting. Apply at spreading rates recommended by coating manufacturer.

1. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact with grout, concrete, masonry, wood, or dissimilar metals.

3.2 ANCHORING POSTS

A. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members.

3.3 ATTACHING RAILINGS

A. Attach railings to wall with wall brackets, except where end flanges are used. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

B. Secure wall brackets and railing end flanges to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
2. For hollow masonry anchorage, use toggle bolts.
3. For wood stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with carpentry work to locate backing members.

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 05520

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SECTION 06100 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Wood blocking and nailers.
3. Wood furring.
4. Wood sleepers.
5. Utility shelving.
6. Plywood backing panels.

1.2 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Provide dressed lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

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

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

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

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood framing members that are less than 18 inches above the ground in crawl spaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.

C. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

D. Application: Treat items indicated on Drawings, and the following:
1. Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

A. Non-Load-Bearing Interior Partitions: Construction or No. 2 grade of any species.

B. Other Framing: Construction or No. 2 grade and any of the following species:

1. Hem-fir (north); NLGA.
2. Douglas fir-larch; WCLIB or WWPA.
3. Mixed southern pine; SPIB.
4. Spruce-pine-fir; NLGA.

5. Douglas fir-south; WWPA.
6. Hem-fir; WCLIB or WWPA.
7. Douglas fir-larch (north); NLGA.
8. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

2.5 MISCELLANEOUS LUMBER

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

1. Blocking.
2. Nailers.
3. Furring.
4. Grounds.
5. Utility shelving.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber of any species.

C. For utility shelving, provide lumber with 15 percent maximum moisture content of eastern white pine, Idaho white, lodgepole, ponderosa, or sugar pine; Premium or No. 2 Common (Sterling) grade; NeLMA, NLGA, WCLIB, or WWPA.

D. For concealed boards, provide lumber with 15 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine, No. 2 grade; SPIB.
2. Eastern softwoods, No. 2 Common grade; NELMA.
3. Northern species, No. 2 Common grade; NLGA.

2.6 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: DOC PS 1, Exterior, AC, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

2.7 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit.

B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.

D. Do not splice structural members between supports unless otherwise indicated.

E. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

F. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
   1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.

END OF SECTION 06100

SECTION 06130

TIMBER FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including general and supplementary conditions and Division 1 specification sections, apply to this section.

1.2 WORK INCLUDED

A. Work includes furnishing labor, materials, and equipment to design, furnish, and install structural and architectural timber framing as detailed in drawings or specified, including structural design of timber frame system, joinery, and connections not provided in drawings, and supplying associated fasteners to complete system and connect timber framing members to structural supports.

B. Types of timber construction specified in this section include the following:

1. Beams, girders, plates, sills, and joists.
2. Columns and posts, braces and bolsters.
3. Solid wood decking.

1.3 RELATED WORK

A. The following sections are related to work of this section:

1. Section 06201 Finish Carpentry.
2. Section 06312-Historic Wood Repair

1.4 DEFINITIONS

A. Inspection Agencies and abbreviations used to reference them include the following:

1. NELMA - Northeastern Lumber Manufacturers Association.
2. NHLA - National Hardwood Lumber Association.
3. NLGA - National Lumber Grades Authority.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Schedule timber delivery and installation to avoid extended on-site storage.

B. Keep timber members dry during delivery and storage. Cover timber with weathertight tarps. Do not store members in areas of high or low relative humidity.

C. Cut and stack timber so as not to encourage growth of sap-stain fungi, mold, carpenter ants, borers, etc.

D. Stack timbers with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

1.6 SUBMITTALS

A. Shop Drawings: Submit for review shop drawings signed and sealed by a Structural Engineer registered in state where project is located. Show design loads, material properties, full dimensions of each member, and layout of timber frame system. Show large-scale details of joints and connections. Provide hardware cut sheets and design values for fasteners.

B. Samples: Full width and depth, 24 inches long, showing range of variation expected in appearance, including surface texture and finish of wood products.

C. Provide manufacturer's certification of moisture content.

1.7 QUALITY ASSURANCE

A. Fabricator and Erector of timber framing shall not have less than ten years experience in fabrication and erection of timber framing. **Engage an experienced timber framing firm to perform work of this Section. Firm shall have completed 3 historic projects similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance, in the last 7 years.**

B. Timbers shall be graded by lumber grading agency certified by American Lumber Standards Committee.

C. Locate grade stamp on timber surfaces not exposed to view in completed work. Grade certification can be submitted in lieu of grade stamping material.

PART 2 - PRODUCTS

2.1 GENERAL

A. General: Comply with PS 20 and grading rules of lumber grading agencies certified by American Lumber Standards Committee Board of Review as applicable.

1. Factory mark each item of timber with grade stamp of grading agency.
2. For exposed timber indicated to receive stained or natural finish, apply grade stamps to surfaces not exposed to view, or omit grade stamps and provide certificates of grade compliance issued by grading agency.

B. Preservative Treatment:

1. For sawn products, Boron treatment of new timber and all accessible/exposed existing timber.

2.2 TIMBER

A. Timber Species and Grade: Species to match existing and meet grading requirements of Select Structural Lumber.

B. Grading Rules: NELMA, NHLA, NLGA

C. For large (10 inch or greater maximum dimension) members, use box heart timbers. For small (less than 10 inch maximum dimension) members, use free of heart center timbers. Do not use timber with excessive reaction wood.

D. Moisture Content: Provide timber with 19 percent maximum moisture content 3 inches from surface at time of installation.Dressing: Provide timber that is rough sawn (Rgh) to match existing timbers.

F. End Sealer: Manufacturer's standard, transparent, colorless wood sealer effective in retarding transmission of moisture at cross-grain cuts and compatible with finish.

2.3 FASTENERS

A. General: Provide fasteners of size and type complying with requirements specified for material and manufacture.

1. Where fasteners are exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide Type 304 stainless steel.

B. Wood Screws: ASME B18.6.1.

C. Proprietary Fasteners:
   1. RSS structural screws by GRK or accepted equivalent.
   2. Timberlok fasteners by FastenMaster or accepted equivalent.
   3. Strong Drive screws (SDS) by Simpson Strong-tie or accepted equivalent.
   4. WFC/WFR/WFD fasteners by SFS intec or accepted equivalent.

D. Lag Bolts: ASME B18.2.1.

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

F. Threaded Rods: ASTM A 36.

G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing in accordance ASTM E 488, performed by a qualified independent testing and inspecting agency.

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

H. Other proprietary connectors:

   1. Timberlinx steel connectors by Timberlinx, Division of Michael Preston Distributors Limited or accepted equivalent.
   2. Other.

2.4 STEEL CONNECTION MATERIALS

A. Unless otherwise indicated, fabricate steel connection materials and steel elements from the following materials:

   1. Structural-steel shapes, plates, and flat bars complying with ASTM A 36.
   2. Round steel bars complying with ASTM A 575, Grade M 1020.
   3. Hot-rolled steel sheet complying with ASTM A 1011, Structural Steel, Type SS, Grade 33.
   4. Stainless steel plate and flat bars complying with ASTM A 666, Type 304
   5. Stainless steel bars and shapes complying with ASTM A 276, Type 304
   6. Stainless steel sheet complying with ASTM A 666, Type 304

B. Finish:
   1. Where not exposed to weather, finish steel assemblies and fasteners with rust-inhibitive primer, 2-mil dry film thickness.

2. Where exposed to weather, hot-dip galvanize steel assemblies and fasteners after fabrication to comply with ASTM A 123/A 123M or ASTM A 153/A 153M.

2.5 FABRICATION

A. Shop fabricate members by cutting and restoring exposed surfaces to match specified surfacing. Predrill for fasteners and assembly of units.

1. Finish exposed surfaces to provide smooth finish. Surface texture shall be equivalent to that of adjacent historic surfaces.

2. Where preservative-treated members are specified, fabricate before treatment to greatest extent possible. Where fabrication must be done after treatment, apply field-treatment preservative to comply with AWPA M4.
   a. Use inorganic boron treatment for members not in contact with ground and continuously protected from water.

B. Camber: Fabricate horizontal members and inclined members with slope of less than 1:1 with natural convex bow (crown) up to provide camber.

C. Timber sizes are to match adjacent timber framing dimensionsat the time of installation. Plane, adze, or otherwise dress timber to square, uniform dimension at joinery locations. Dressed dimensions shall be equal to member replaced or repaired.

D. Waney edges are permitted provided they do not exceed 1/8 of a face..

E. Timbers with moderate bow are permitted where their intended use will straighten them. Place crowns up for spanning members. Do not use severely bowed timbers or timbers bowed in more than one direction.

F. Remove staining from soil, oil, or grease.

G. Cut joints accurately to make neat, snug fit.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. General: Erect heavy timber construction true and plumb. Provide temporary bracing to maintain lines and levels until permanent supporting members are in place.

B. Handle and temporarily support heavy timber construction to prevent surface damage, compression, and other effects that might interfere with indicated finish. Tools used to drive or pull joints together shall not mar finished surface of timber.

C. Framing adjacent to masonry: Provide 1/2-inch clearance at tops, sides, and ends of members adjacent to masonry unless otherwise indicated.

D. Cutting: Avoid extra cutting after fabrication. Where field fitting is unavoidable, comply with finish and preservative treatment requirements for shop fabrication.

3.2 STRUCTURAL TESTS AND INSPECTIONS

A. Notify Special Inspector when structural framing is complete. Timber framing shall be inspected and approved prior to enclosing walls, floors, roofs, or ceilings.

3.3 ADJUSTING AND CLEANING

A. Repair damaged surfaces and finishes after completing erection. Replace damaged heavy timber construction if repairs are not approved by Architect.

3.4 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

3.5

END OF SECTION 06130

SECTION 06200

INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior trim.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber: DOC PS 20.

1. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.

a. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by inspection agency.

2.2 INTERIOR TRIM

A. Softwood Lumber Trim:
1. Species and Grade: Southern pine, B & B finish; SPIB.
2. Maximum Moisture Content: 15 percent.

B. Moldings for Opaque Finish (Painted Finish): Made to patterns included in WMMPA WM 12.

1. Softwood Moldings: WMMPA WM 4, P grade.

a. Species: Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine.
b. Maximum Moisture Content: 15 percent.

2.3 MISCELLANEOUS MATERIALS

A. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.2 INSTALLATION, GENERAL

A. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
2. Countersink fasteners, fill surface flush, and sand unless otherwise indicated.
3. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.

3.3 STANDING AND RUNNING TRIM INSTALLATION

A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints.

END OF SECTION 06200

SECTION 06210

EXTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior wood trim.
2. Lumber siding.

1.2 ACTION SUBMITTALS

A. Samples: For each type of product involving selection of colors, profiles, or textures.

1.3 QUALITY ASSURANCE

A. **Engage an experienced carpentry firm to perform work of this Section. Firm shall have completed 3 historic projects similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance, in the last 7 years.**

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber: DOC PS 20.

1. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.

   a. For exposed lumber, mark grade stamp on end or back of each piece**,** or omit grade stamp and provide certificates of grade compliance issued by inspection agency.

2.2 EXTERIOR TRIM

A. Lumber Trim:
1. Species and Grade: Western red cedar, Grade A; NLGA, WCLIB, or WWPA.
2. Maximum Moisture Content: 19 percent.
3. Face Surface: Surfaced (smooth).

B. Moldings: WMMPA WM 4, N-grade wood moldings, without finger jointing. Made from kiln-dried stock to patterns included in WMMPA WM 12.

1. Species: Western red cedar

2.3 LUMBER SIDING

A. Provide kiln-dried lumber siding complying with DOC PS 20.

B. Species and Grade: Grade A western red cedar; NLGA, WCLIB, or WWPA.

2.4 MISCELLANEOUS MATERIALS

A. Fasteners for Exterior Finish Carpentry: Provide nails or screws, in sufficient length to penetrate not less than 1-1/2 inches into wood substrate.
1. For applications not otherwise indicated, provide stainless-steel fasteners.

B. Sealants: Latex, complying with ASTM C 834 Type OP, Grade NF and with applicable requirements in Section 079200 "Joint Sealants," recommended by sealant manufacturer and manufacturer of substrates for intended application.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prime lumber, trim and moldings to be painted, including both faces and edges, unless factory primed. Cut to required lengths and prime ends. Comply with requirements in Section 09911 "Exterior Painting."

3.2 INSTALLATION, GENERAL

A. Install exterior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

1. Scribe and cut exterior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.

3.3 STANDING AND RUNNING TRIM INSTALLATION

A. Install trim with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long except where necessary.

1. Use scarf joints for end-to-end joints.
2. Stagger end joints in adjacent and related members.

B. Fit exterior joints to exclude water. Cope at returns and miter at corners.

3.4 SIDING INSTALLATION

A. Install siding to comply with manufacturer's written instructions.

B. Lumber Siding: Apply starter strip along bottom edge of sheathing or sill. Install first course of siding with lower edge at least 1/8 inch below starter strip and subsequent courses lapped 1 inch over course below. Nail at each stud. Do not allow nails to penetrate more than one thickness of siding.

END OF SECTION 06210

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SECTION 06312

HISTORIC WOOD REPAIR

PART 1 - GENERAL

1.01 SUMMARY

A. This procedure includes guidance on stabilizing decayed wood members with epoxy consolidant and filler.

B. Deterioration and decay in wood results from moisture infiltration, accompanying fungal growth and insect infestation. Paint, caulk and sealant failures are also a major cause of wood deterioration.

C. Some sources of moisture may include the original moisture in green wood, rainwater, condensation, ground water, piped water, and water released by water-conducting fungus through the process of decay itself.

D. Epoxy repair may be appropriate if:

1. the piece to be repaired is historically significant. Epoxy repair makes it possible to retain most of an original component by selectively repairing only the damaged area.

2. if the piece is decorative and replacement would be too expensive or impossible.

E. Epoxy repair may NOT be appropriate if:

1. the piece is a structural member. Epoxy has adequate compression strength, but is not the best choice to repair a member in tension. In this case, replacement is usually a better option.

2. the wood to be repaired is to remain unpainted, as the epoxy is quite different in appearance than wood. In this case, the wood should be selectively replaced.

3. if the area to be repaired is large, as epoxy repair can be expensive.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Conservation Services

8 Lakeside Trail
Kinnelon, NJ 07405
201/838-6412

B. Abatron, Inc.
5501 95th Ave.
Kenosha, WI 53144
800/445-1754 or 414/653-2000

C. Roux Laboratories
5344 Overmyer Dr.
Jacksonville, FL 32205
904/693-1200

D. ConServ Epoxy, LLC
PO Box 454
Northford, CT 06472
203/484-4123

2.02 MATERIALS

A. Epoxy consolidant and epoxy filler, both are multiple part compounds. Purchase by the gallon unless a large amount of epoxying needs to be done. Use one of the following, or approved equal:

1. "Con Serv (T) Flexible Consolidant 100" (Conservation Services): Cures slowly with a 5 to 7 hour application time to allow deep penetration. Complete hardness is achieved in 3 to 6 days.

2. "Con Serv (T) Flexible Patch 200" (Conservation Services): A four part putty- like filler; Is not easy to mix in small amounts; Consistency and hardness are easily controlled with this material.

NOTE: The products of Conservation Services are recommended for treatment of thicker wood such as window sills. Because of its slower curing time, it allows for deeper penetration into members.

3. "Liquidwood-1" Consolidant (Abatron): Solidifies in a short period of time.

4. "Woodepox-2" Adhesive Paste (Abatron): A two-part paste mix; final hardness is determined by varying the ratio of the two parts. The LiquidWood can be used as a thinner, but this reduces the flexibility of the filler.

NOTE: These Abatron products are recommended for use on smaller members such as window sashes where deep penetration of consolidant is not required. The quick drying feature is an advantage for small, but repetitive, jobs. Abatron carries twenty different types of wood consolidants with varying degrees of penetration.

B. Oil clay that can be purchased from a hobby store – used to keep consolidant from leaking through cracks.

C. Nitril Rubber Gloves (Abatron)

D. Disposable vinyl gloves: Available from drug store or pharmaceutical supply distributor in 50 count or larger boxes.

2.03 EQUIPMENT

A. Plastic bottles, like those used for hair dye, to the consolidant; having many on hand is recommended. Cleaning of the bottles for reuse is possible.

B. Applicator bottles: Available from drug store and sold for hair dye application usually in 8 fl. oz. size; Also available in bulk from Roux Laboratories. Roux Color Applicators lend themselves more easily to cleaning and reuse.

C. Rags of different sizes to wipe up spills before epoxy has a chance to harden, small rags are recommended for quick one time uses such as wiping off spouts and caps.

D. Thin wooden sticks, approximately 8" long for scooping out paste and mixing consolidant.

E. Goggles and a respirator for protection from fumes.

F. Putty knives for application of filler

G. Channel lock pliers for opening stuck caps

H. Allen wrench to clean out cap holes

I. Needle nose pliers to pull out hardened epoxy

J. 1/8"x8"x12" Masonite boards for mixing paste filler

K. Carbon dioxide fire extinguisher: Curing epoxy creates heat that may cause fire

L. Rotary saw

M. Air compressor

N. Drill

O. Stiff bristle brushes

PART 3 - EXECUTION

3.01 EXAMINATION

A. Detect rot using the "Pick Test":

1. Insert an ice pick into the wood at a slight angle.

2. Lift the pick out. If the wood splinters in long pieces, the wood is ok. If the wood snaps where the pick is being lifted, the wood is decayed.

B. When rot is discovered:

1. Determine the source of moisture infiltration and eliminate it.

a. If rot is only present on the surface, drying is all that is necessary to stop the spread of decay and kill off any growth.

2. If source of moisture is unknown, treat the wood with a preservative.

a. Preservatives are caustic chemicals and should be handled with care.

b. A particularly dangerous wood preserving chemical is pentachlorophenol (a.k.a. penta).

CAUTION: THIS CHEMICAL IS CARCINOGENIC AND ITS USE IS BANNED IN MANY STATES.

3. Preservatives will eliminate fungal growth, but generally do not restore strength to the deteriorated wood material.

3.02 PREPARATION

A. Surface Preparation:

1. Dry affected wood member completely to arrest further decay. Dry in place if possible –or remove the member and keep in a cool dry place until dry.

CAUTION: IF THIS PRECAUTION IS NOT TAKEN, THE EPOXY CAN

ACTUALLY TRAP MOISTURE IN WOOD FIBERS AND ACCELERATE THE DECAY PROCESS.

2. Have all materials at hand before the mixing process begins.

3. Label all caps and lids so that a cap or lid is not placed on the wrong container or it may remain there permanently.

3.03 ERECTION, INSTALLATION AND APPLICATION

CAUTION: AS EPOXIES CURE, HEAT IS PRODUCED. FOR THIS REASON, EPOXIES SHOULD BE USED IN SMALL QUANTITIES TO DETER EXTENSIVE HEAT BUILD-UP. CARE SHOULD BE TAKEN WHEN USING EPOXY ON A HOT DAY.

A. Repair decayed wood using epoxy wood consolidant:

1. Drill 1/4" or 3/16" holes in affected wood to receive epoxy consolidant:

a. Drill holes at an angle and spaced approximately 2" on center in staggered rows. The top of one hole should line up with the bottom of the next hole.

CAUTION: BE SURE NOT TO DRILL THROUGH THE ENTIRE SURFACE FOR CONSOLIDANT WILL LEAK OUT FROM BEHIND.

b. Dam any surface cracks with oil clay so that epoxy will not leak.

2. Remove sawdust and dirt from drilled holes using compressed air or stiff bristle brushes.

3. Following manufacturer's instructions, mix a small amount of the consolidant components (resin and hardener) together in an applicator bottle. Stir the mixture thoroughly by hand with a thin stick for 4 minutes or with a bent coat hanger chucked into a drill for 2 minutes.

4. Using a large plastic syringe or squeeze bottle and tube spout, carefully squirt the consolidant into the pre-drilled holes. Completely saturate the wood, moving from hole to hole refilling until the wood can hold no more. More than one application may be needed.

5. Wipe off any excess consolidant or spills and cover the treated area to protect until cured as directed by epoxy manufacturer.

6. If severed pieces need to be re-attached, glue them in place with a mixture of consolidant and filler.

B. When the consolidant has cured, fill the voids in the surface with epoxy filler (wood-epoxy putty):

1. Mix the two part epoxy filler following the same procedures for mixing consolidant in Section 3.03 A.3. above. Mix filler to achieve the consistency of a glazing compound that can be worked with a putty knife.

2. Apply the filler to the surface:

   a. For large voids, apply filler in 1" thick layers. This reduces the possibility of problems associated with heat build-up.

   b. Build up filler layers slightly above the wood surface to allow for planing and sanding smooth after it has cured.

3. When the filler has cured, sand or plane the surface smooth.

4. Apply a wood preservative to surrounding wood surfaces and prime and paint the entire surface.

END OF SECTION

SECTION 07600

SHEET METAL ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes custom-fabricated, flat-seam sheet metal roofing and plywood underlayment.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 WARRANTY

Warranty Period: Two years from date of Substantial Completion.

Engage an experienced stone repointing firm to perform work of this Section. Firm shall have completed 3 historic projects similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance, in the last 7 years.

PART 2 - PRODUCTS

PERFORMANCE REQUIREMENTS

A. General Performance: Sheet metal roofing system including, but not limited to, metal roof panels, cleats, anchors and fasteners, sheet metal flashing integral with sheet metal roofing, underlayment, and accessories, shall comply with requirements without failure due to defective manufacture, fabrication, or installation, or due to other defects in construction. Sheet metal roofing shall remain watertight.

Copper Roofing Standard: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

2.2 ROOFING SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Tin/Zinc Coated Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 temper.

1. Weight (Thickness): 20 oz./sq. ft. unless otherwise indicated.

UNDERLAYMENT MATERIALS

Felts: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felts.

Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. minimum.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete roofing system and as recommended by primary sheet metal manufacturer unless otherwise indicated.

B. Plywood Sheathing: Two layers, ¾” marine grade plywood, continuous sheathing.

C. Roofing Fasteners: Wood screws, annular-threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.

D. Fasteners for Copper Sheet: Copper, hardware bronze, or passivated Series 300 stainless steel.

E. Solder:
For Copper: ASTM B 32, Pure tin or lead-free, high tin.

2.5 ACCESSORIES

A. Sheet Metal Accessories: Provide components required for complete sheet metal roofing assembly including trim, copings, fasciae, corner units, clips, flashings, sealants, gaskets, fillers, metal closures, closure strips, and similar items. Match material and finish of sheet metal roofing unless otherwise indicated.

Cleats: Intermittent and continuous attachment devices for mechanically seaming into joints and formed from the following materials and thicknesses unless otherwise indicated:
Copper Roofing: 20-oz./sq. ft. copper sheet.

D. Flashing and Trim: Formed from same material and with same finish as sheet metal roofing, minimum 20-oz./sq. ft. tin/zinc coated copper sheet.

FABRICATION

A. General: Custom fabricate sheet metal roofing to comply with details shown and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design,

dimensions (panel width and seam height), geometry, metal thickness, and other characteristics of installation. Fabricate sheet metal roofing and accessories in shop to greatest extent possible.

B. Flat-Seam Roofing: Form flat-seam panels from tin/zinc coated copper sheets 18 x 24 inches with 3/4-inch notched and folded edges.

C. Form exposed sheet metal work to fit substrates with little oil canning; free of buckling and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.

D. Form and fabricate sheets, seams, strips, cleats, valleys, ridges, edge treatments, integral flashings, and other components of metal roofing to profiles, patterns, and drainage arrangements indicated on Drawings and as required for leakproof construction.

E. Sheet Metal Accessories: Custom fabricate flashings and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item required. Obtain field measurements for accurate fit before shop fabrication.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Examine solid roof sheathing to verify that sheathing joints are fully supported and that tops of fasteners are flush with surface.

3.2 UNDERLAYMENT INSTALLATION

A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal roofing. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.

B. Apply slip sheet, wrinkle free, before installing sheet metal roofing and related flashing.

3.3 CUSTOM-FABRICATED SHEET METAL ROOFING INSTALLATION

A. Fabricate and install work with lines and corners of exposed units true and accurate. Form exposed faces flat and free of buckles, excessive waves, and avoidable tool marks, considering metal temper and reflectivity. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant. Fold back sheet metal to form hem on concealed side of exposed edges unless otherwise indicated.

1. Install cleats to hold sheet metal panels in position. Attach each cleat with at least two fasteners to prevent rotation.
2. Space cleats not more than 6 inches o.c. Bend tabs over fastener head.

Provide expansion-type cleats for roof panels that exceed 30 feet in length.

B. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to a width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work.
Do not use torches for soldering.
2. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
3. Copper Soldering: Tin edges of uncoated sheets, using solder for copper.

Flat-Seam Roofing: Attach flat-seam metal panels to substrate with cleats, starting at the low point and working upward toward ridge. After panels are in place, mallet seams tight and solder.

1. Attach roofing panels with cleats spaced not more than 6” o.c. Lock and solder panels to base flashing.

3.4 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for complete sheet metal roofing assembly including trim, copings, drain sleeves, seam covers, flashings, sealants, gaskets, fillers, metal closures, closure strips, and similar items.

Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and install units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

3.5 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

END OF SECTION 07600

SECTION 07620

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Formed wall sheet metal fabrications.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. Sheet Metal Standard for Copper: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

2.2 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 or H01 temper.

1. 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:

a. Hussey Copper Ltd.
b. Revere Copper Products, Inc.

2.3 UNDERLAYMENT MATERIALS

A. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.

B. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. minimum.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal unless otherwise indicated.

1. Fasteners for Copper Sheet: Copper, hardware bronze or passivated Series 300 stainless steel.

B. Solder:

1. For Copper: ASTM B 32, with maximum lead content of 0.2 percent.

2.5 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.

1. Obtain field measurements for accurate fit before shop fabrication.
2. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.

3. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

C. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

E. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.

F. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

2.6 ROOF-DRAINAGE SHEET METAL FABRICATIONS

A. Base Flashing: Fabricate from the following materials:

1. Copper: 20 oz./sq. ft.

B. Counterflashing and Flashing Receivers: Fabricate from the following materials:

1. Copper: 16 oz./sq. ft..

PART 3 - EXECUTION

3.1 UNDERLAYMENT INSTALLATION

A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.

2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
5. **Torch cutting of sheet metal flashing and trim is not permitted.**

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
1. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work.
1. **Do not use torches for soldering.**
2. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
3. Copper Soldering: Tin edges of uncoated sheets, using solder for copper.

3.3 ROOF-DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.

3.4 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide

concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate.

3.5 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

END OF SECTION

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SECTION 07920

JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes joint sealants for the following applications, including those specified by reference to this Section:

1. Exterior joints in vertical surfaces and horizontal nontraffic surfaces.

1.2 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

1.4 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: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

2.2 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. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 ELASTOMERIC 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: Where elastomeric sealants are specified to be nonstaining 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. Single-Component Silicone Sealant:

1. Products:

a. Dow Corning Corporation
b. GE Silicones
c. Tremco
d. Pecora Corporation

2.4 LATEX JOINT SEALANTS

A. Latex Sealant: Comply with ASTM C 834, Type O P, Grade NF.

B. Products:

1. Bostik Findley; Chem-Calk 600.
2. Pecora Corporation; AC-20+.
3. Schnee-Morehead, Inc.; SM 8200.
4. Sonneborn, Division of ChemRex Inc.; Sonolac.
5. Tremco; Tremflex 834.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants.

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant.

a. 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.

2. Remove laitance and form-release agents from concrete.

a. 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.

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.

3.2 INSTALLATION

A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

B. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

C. 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.

D. Tooling of Nonsag 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.

E. 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.

END OF SECTION 07920

SECTION 08140

STILE AND RAIL WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Interior stile and rail wood doors.
   2. Priming and Finishing stile and rail wood doors.
   3. Fitting stile and rail wood doors to frames and machining for hardware.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For stile and rail wood doors. Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and other pertinent data.

1.3 INFORMATIONAL SUBMITTALS

A. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is a certified participant in AWI's Quality Certification Program.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Use only materials that comply with referenced standards and other requirements specified. Assemble exterior doors and sidelites with wet-use adhesives.

B. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain urea formaldehyde.

C. Low-Emitting Materials: Fabricate doors with [**adhesives**] [**and**] [**composite wood products**] that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 INTERIOR STILE AND RAIL WOOD DOORS

A. Interior Stile and Rail Wood Doors: Interior doors complying with WDMA I.S.6, "Industry Standard for Wood Stile and Rail Doors," and with other requirements specified.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Simpson Door Company; or comparable product

   2. Finish and Grade: Opaque and Standard.
   3. Wood Species: Douglas fir or western hemlock, vertical sawed/sliced.

   4. Door Construction for Opaque Finish:

      a. Stile and Rail Construction: Clear softwood; may be edge glued for width and finger jointed.
      b. Raised-Panel Construction: Clear softwood lumber; edge glued for width.

   5. Raised-Panel Thickness: 1-3/8 inches.

2.3 STILE AND RAIL WOOD DOOR FABRICATION

A. Fabricate stile and rail wood doors in sizes indicated for field fitting.

B. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels unless otherwise indicated:

   1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/2 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide not more than 3/8 inch from bottom of door to top of threshold.

      a. Comply with NFPA 80 for fire-rated doors.

   2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.

C. Factory machine doors for hardware that is not surface applied.

2.4 SHOP PRIMING

A. Doors for Opaque Finish: Shop prime faces, all four edges, edges of cutouts, and mortises with one coat of wood primer.

2.5 FINISHING

A. Finish with two coats of semi-gloss paint.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hardware: For installation, see Section 08710 "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.

C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 3/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.

END OF SECTION 08140

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SECTION 08710

DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Mechanical door hardware for the following:

a. Swinging doors.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Other Action Submittals:

1. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1.3 QUALITY ASSURANCE

A. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as follows:

1. For door hardware, an Architectural Hardware Consultant (AHC).

B. Accessibility Requirements: For door hardware on doors in an accessible route, comply with 521 CMR.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. Provide door hardware for each door as scheduled on Drawings to comply with requirements in this Section.

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, products equivalent in function and comparable in quality to named products.

2.2 SELF-CLOSING HINGES AND PIVOTS

A. Self-Closing Hinges and Pivots: BHMA A156.17.

B. 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:

C. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   a. Bommer Industries, Inc.
   b. McKinney Products Company; an ASSA ABLOY Group company.
   c. Stanley Commercial Hardware; Div. of The Stanley Works.

2.3 MECHANICAL LOCKS AND LATCHES

A. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.
   1. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.

B. Bored Locks: BHMA A156.2; Grade 1; Series 4000.

1. 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:

2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   a. Marks USA.
   b. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
   c. Schlage Commercial Lock Division; an Ingersoll-Rand company.

2.4 AUXILIARY LOCKS

A. Bored Auxiliary Locks: BHMA A156.5: Grade 1; with strike that suits frame.

1. 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:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   a. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
   b. Schlage Commercial Lock Division; an Ingersoll-Rand company.
   c. Yale Security Inc.; an ASSA ABLOY Group company.

2.5 MECHANICAL STOPS AND HOLDERS

A. Wall- and Floor-Mounted Stops: BHMA A156.16; polished cast brass, bronze, or aluminum base metal.

1. 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:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   a. Hager Companies.
   b. Hiawatha, Inc.
   c. IVES Hardware; an Ingersoll-Rand company.

2.6 METAL PROTECTIVE TRIM UNITS

A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch- thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.

1. 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:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   a. Hiawatha, Inc.
   b. IVES Hardware; an Ingersoll-Rand company.

c. Rockwood Manufacturing Company.

2.7 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.

2.8 FINISHES

A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."

B. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
1. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
2. 521 CMR.

C. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

D. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

E. Stops: Provide kickdown door stops.

F. Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

END OF SECTION 08710

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SECTION 092900

GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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.

2.2 INTERIOR GYPSUM BOARD

A. Gypsum Wallboard: ASTM C 1396/C 1396M.

1. Thickness: 5/8”.
2. Long Edges: Tapered.

B. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

C. Gypsum Ceiling Board: ASTM C 1396/C 1396M.

1. Thickness: 1/2 inch.
2. Long Edges: Tapered.

2.3 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.

2.4 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

2.5 AUXILIARY MATERIALS

A. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

B. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) in Toilet Room Walls.

1. Recycled Content of Blankets: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

C. Acoustical Joint Sealant: ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings as demonstrated by testing according to ASTM E 90.

1. Acoustical joint sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 APPLYING AND FINISHING PANELS

A. Comply with ASTM C 840.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. 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.

D. Prefill open joints, rounded or beveled edges, and damaged surface areas.

E. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

F. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for FRP.
3. Level 5: At panel surfaces exposed to view.
   a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

G. Protect adjacent surfaces from drywall compound and texture finishes and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

H. Do not compound joints wider than 3” on panels in toilet rooms intended to be faced with Fiberglass Reinforced Panels.

I. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 09290

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SECTION 09650

RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Vinyl composition floor tile.
   2. Rubber cove base.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: 2 x 2 sample of each color and pattern of floor tile required.

C. Samples: vinyl cove base chain.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

   1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 VINYL COMPOSITION FLOOR TILE

A. Products: Subject to compliance with requirements available products that may be incorporated into the Work include, but are not limited to, the following:
   1. Armstrong World Industries, Inc; Standard Excelon Imperial Texture.
   2. Congoleum Corporation; Alternatives.
   3. Mannington Mills, Inc; Primary Elements, LVT

B. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.

C. Wearing Surface: Smooth.

D. Thickness: 0.125 inch.

E. Size: 12 by 12 inches.

F. Colors and Patterns: As selected by Architect from full range of standard colors.

2.3 RUBBER COVE BASE

A. 4’ rubber cove base

B. Preformed interior and exterior corners.

C. Color to be selected from full range of standard colors.

2.4 INSTALLATION MATERIALS

A. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

1. Adhesives shall comply with the following limits for VOC content:

a. Vinyl Composition Tile Adhesives: 50 g/L or less.

B. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install floor tiles until they are the same temperature as the space where they are to be installed.

D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.2 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles square with room axis.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern).

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.

G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.3 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.

B. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.

1. Apply two coat(s).

C. Cover floor tile until Substantial Completion.

END OF SECTION 09650

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SECTION 09680

SHEET CARPETING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes loop carpet and carpet cushion.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Warrant: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced Installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

B. Fire-Test-Response Ratings: Where indicated, provide carpet and carpet cushion identical to those of assemblies tested for fire response per NFPA 253 by a qualified testing agency.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104.

1.8 FIELD CONDITIONS

A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.

1.9 WARRANTY

A. Special Warranty for Carpet: Manufacturer agrees to repair or replace components of carpet installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination.
3. Warranty Period: 10 years from date of Substantial Completion.

B. Special Warranty for Carpet Cushion: Manufacturer agrees to repair or replace components of carpet cushion installation that fail in materials or workmanship within specified warranty period.

1. Warranty includes consequent removal and replacement of carpet and accessories.
2. Warranty does not include deterioration or failure of carpet cushion due to unusual traffic, failure of substrate, vandalism, or abuse.
3. Failure includes, but is not limited to, permanent indentation or compression.
4. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TUFTED CARPET

A. Basis-of-Design Product: Subject to compliance with requirements, provide Aladdin Commercial; Rule Breaker style, or comparable product by one of the following:

B. Color: As selected by Architect from manufacturer's full range.

C. Pattern: Level loop

D. Fiber Content: EnviroStrand SD Pet

E. Fiber Type: Solution Dyed.

F. Pile Characteristic: Level-loop pile.

G. Density: 26 oz./cu. yd.

H. Pile Thickness: <**Insert inches (mm)**> for finished carpet[**per ASTM D 6859**].

I. Stitches: 12.6 stitches per inch.

J. Gage: 1/10 gage in ends per inch.

K. Backing System: Weldlok.

L. Width: 12 feet.

M. Applied Soil-Resistance Treatment: Mohawk Protection Plus Soil.

N. Performance Characteristics: As follows:
   1. Flammability: ASTM E 648, Class 1
   2. Smoke Density: ASTM 662, Less than 450.

2.2 CARPET CUSHION

A. Basis-of-Design Product: Subject to compliance with requirements, Aladdin Smart Step Cushion or comparable product.

B. Traffic Classification: CCC Class I, moderate traffic.

C. Fiber Cushion: Synthetic.

   1. Weight: 20 oz./sq. yd.
   2. Thickness: 0.245 inches plus 5 percent maximum.
   3. Density: 7.0 lb/cu. ft..

D. Performance Characteristics: As follows:

   1. Critical Radiant Flux Classification: Not less than 1.07w/cm2).

2.3 INSTALLATION ACCESSORIES

A. Tackless Carpet Stripping: Water-resistant plywood, in strips as required to match cushion thickness and that comply with CRI 104, Section 12.2.

B. Seam Adhesive: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for sealing and taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.

PART 3 - EXECUTION

3.1 INSTALLATION

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 performance. Examine carpet for type, color, pattern, and potential defects.

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

C. Preparation: Comply with CRI 104, Section 7.3, "Site Conditions; Floor Preparation," and with carpet manufacturer's written installation instructions for preparing substrates.

D. Installation: Comply with CRI 104 and carpet and carpet cushion manufacturers' written installation instructions for the following:
   1. Stretch-in Installation: Comply with CRI 104, Section 12, "Stretch-in Installations."

E. Comply with carpet manufacturer's written recommendations and Shop Drawings for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.

F. Do not bridge building expansion joints with carpet.

G. Cut and fit carpet 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 manufacturer.

H. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

I. 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, nonstaining marking device.

J. Install pattern parallel to walls and borders to comply with CRI 104, Section 15, "Patterned Carpet Installations" and with carpet manufacturer's written recommendations.

K. Comply with carpet cushion manufacturer's written recommendations.

L. Perform the following operations immediately after installing carpet:

   1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
   2. Remove yarns that protrude from carpet surface.
   3. Vacuum carpet using commercial machine with face-beater element.

M. Protect installed carpet to comply with CRI 104, Section 16, "Protecting Indoor Installations."

END OF SECTION 09680

SECTION 09900

EXTERIOR PAINTING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The extent of Exterior Painting includes, but is not limited to the following:
1. Painting of repaired/replaced clapboards and trim.
2. Painting of belfry louvers.
3. Painting of exterior doors.
4. Painting of ramp system.

B. Generally, work will include the following scope.
1. All work to conform to current OSHA and EPA standards for lead paint removal. The wood returns on the roof are the only areas that potentially contain lead paint.

2. Assess substrate and determine if conditions require repair or may otherwise adversely impact the success of the project.

3. Wash all surfaces to be painted using Owner approved solution.

4. Scrape loose paint by hand; retain paint where directed by Project Manager.

5. Sand surface and feather edges to provide a smooth transition between layers of paint accumulation.

6. Apply one coat of primer using method best suited for application; finish by brush. Spot prime all nail heads with a rust inhibitor. Caulk all joints or gaps 1/8” or less around doors, windows, or vertical joints of siding using latex caulk.

7. Lightly sand rough or fuzzed areas by hand.

8. Apply at least two finish coats of paint using method best suited for application; finish by brush. Ensure full coverage and uniform color by applying additional coats as required.

9. Review areas indicating stains due to corrosion of hardware.

10. Paint and label owner provided sample paint sticks.

C. The intent of this work shall be to provide a very high quality, durable paint finish, while preventing any removal, destruction or adverse effects to the historic

substrate.

1. The work includes preparation and painting with a three-coat system (prime and finish coating) of exterior exposed materials and surfaces of all exterior surfaces and finishes.

2. Paint as used herein means all coating systems materials, including primers, emulsions, enamels, sealers, and other applied materials used as a primer or finish coating.

3. A coat refers to an application of paint at the required millimeter. thickness for each coating applied, as specified by the manufacturer.

4. Paint all exposed surfaces whether or not colors are designated, except where the natural (unpainted) finish of the materials is obviously intended and specifically noted as a surface not to be painted. Where items or surfaces are not specifically mentioned consult with Owner for direction as these areas will likely be painted the same as adjacent areas or material.

5. No samples shall be required for this work, unless specified by contract documents.

1.2 SUBMITTALS

A. Submit manufacturer's literature and data on any relevant materials.

B. Submit manufacturer's warranty information.

C. At project completion, a minimum of 1 quart of each type and color of paint/primer from the same production run (batch mix) used will be left, properly labeled and identified, and dated for Owner's later use in maintenance. Store where directed. Color formulas and vendor information for each color used will also be given to Owner for future reference.

D. Submit labeled paint stick.

1.3 PROTECTION

A. Perform all work that disturbs lead-containing paint (LCP), handle all material that involves lead-containing paint, and transport and dispose of all lead- containing paint and residue in compliance with all applicable federal, state, and local laws and regulations for identification, removal, labeling, handling, containerization, transportation, and disposal of lead-containing material.

B. Provide protection for roofs, entrances, windows, walls and landscape as necessary to prevent damage during entire course of work of this Section.

C. Provide protective barriers to ensure the safety of visitors and site staff.

1. Take all the safety of passersby near scaffolding and work areas. This includes setting up cones and safety tape as a barrier to block off areas as needed.

D. Take all necessary precautions to protect all persons, whether engaged in work of this Section or not, from all hazards of any kind associated with the work of this Section.

E. Take all necessary precautions to prevent fire and spread of fire.

F. Provide a properly rated 10 lb. fire extinguisher close by all workstations.

G. Provide adequate ventilation during use of volatile or noxious substances.

H. All MSDS are to be available and copies kept on-site until Project completion. All persons using materials are to be familiar with information contained within the documents and proper safety precautions are to be followed.

1.4 QUALITY ASSURANCE

A. General: Painting Contractor shall be skilled and experienced in this type of painting and equipped to perform workmanship in accordance with industry standards, manufacturer's specifications and all applicable building codes.

1. Employ only tradespeople experienced in painting.
2. Any subcontractors used are subject to the approval of the Owner.

B. Materials: Obtain all paint from one manufacturer, at the same time, and from the same distributor to ensure homogeneity of manufacture and formula.

1. All materials will be used according to manufacturer's specifications and standard industry practices.
2. Contractor shall ensure that all project materials are protected from adverse weather during construction.

C. Prior to beginning any work, evaluate substrate and notify Owner of conditions which require repair or may otherwise adversely impact the success of the project.

1.5 PRODUCT HANDLING

A. All products shall be stored and installed in a manner which upholds the manufacturer's warranty unless directed to do otherwise by the Owner.

B. All materials will be delivered to the site in their original containers baring manufacturer's label and instructions.

1.6 JOB CONDITIONS

A. Pre-work Conference: Prior to the initiation of any work, meet at the project site with the Contractor, all approved subcontractors, and the Owner to discuss the project. Owner will record the discussions of the conference and the decisions and agreements (or disagreements) reached, and furnish a copy of the minutes to each party. Review foreseeable methods and procedures related to the painting work, including but not necessarily limited to the following:

1. Review project requirements (Specifications and other Contract Documents).
2. Review required submittals, both completed and yet to be completed.
3. Review availability of materials, tradespeople, equipment and facilities needed to make progress and avoid delays.
4. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions, including the possibility of temporary coverings.
5. Review procedures needed for protection of the building during the remainder of the construction period.
6. Review staging strategy if required.
7. Verify all quantities, dimensions and materials in the field.

B. Weather Condition Limitations: Proceed with work only when weather conditions will permit unrestricted use of materials, ensure quality control and ensure water will not enter the building envelope. All installation procedures must comply with standard construction practices and manufacturer's recommendations where applicable.

C. Examination of Substrate: The Contractor must examine the substrate and other conditions within which the repairs are to be performed, and notify the Owner of any unsatisfactory conditions. Do not proceed with any work until unsatisfactory conditions have been corrected in an acceptable manner and approved by the Owner.

D. Every effort shall be made to accommodate the reasonable needs of the Egremont Free Library site personnel in relation to scheduling.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning:

1. Gentlest means possible should be utilized. Attempt to use water at a pressure less than 60 psi and a natural bristle brush before moving on to a harsher means.

2. If stubborn biological staining exists, a 3:1 hot water: bleach mixture should be applied by handheld compression tank sprayer or by hand with a natural brush. Thoroughly rinse the area with clean water at a pressure of less than 60 psi.

3. The use of tri-sodium-phosphate (TSP) or other products containing phosphates or sodium (soluble salts) is forbidden.

B. Paint Removal

1. Mechanical: Scrape with hand tools all surfaces exhibiting areas of loose or peeling paint, and areas of adhesion failure. Hand sanding after scraping is preferable using a grit no lower than 80, but appropriate to achieve a smooth surface but not remove substrate. Sandpaper should be industrial, open-coat. Random orbital or palm sanders may be used, only following agreement by owner, so long as no or very minimal removal of existing substrate results. Any sander must have attached dust collector.

    a. Sand paper of the appropriate grit should also be used to sand rough or fuzzed areas left after priming—but should not expose substrate.

2. Heat: If areas have been specified to be stripped bare of paint, this will be accomplished by an infrared heater or steam. No heat guns will be used on fragments in situ.

3. Chemical: Chemical strippers shall be reserved for use in special situations, and shall never be used unless specified according to the scope of work of the contract documents. If a chemical stripper is used, preference will be given to an environmentally friendly product; no methylene chloride strippers shall be used. Chemical strippers shall never be used in situ.

C. Wood Treatment:
1. For rotted and deteriorated areas, utilize a two-part wood epoxy consolidant applied per manufactures' directions. No styrene products should be used.

2. Apply a 50:50 mixture of boiled linseed oil and turpentine to wood that has been exposed to weather in order to rejuvenate the wood prior to painting. Apply one coat using a brush or rag. Allow to dry 24 to 48 hours prior to priming. Use care when disposing of rags.

D. Primer:
1. Primer shall be Sherwin Williams, Exterior Oil-Based Wood Primer, white, flat finish, or approved equal. Use primer by same vendor as finish paint.

E. Caulk:
1. See Joint Sealants, Section 07920.

F. Finish Paint:
1. Paint shall be as below or approved equal.
    a. Trim: Sherwin Williams; Duration, Exterior Acrylic Latex; Color, to match existing.
    b. All paint shall be obtained from the same vendor at the same time.

PART 3 - EXECUTION

3.1 GENERAL PROCEDURES

A. Perform preparations and cleaning procedures in strict accordance with manufacturer's instructions and as herein specified, for each substrate condition. Progression of work from preparation to priming and painting shall proceed in a timely fashion so as to not allow time for bared, prepped, or primed, unfinished or incompletely finished substrate to dwell unnecessarily in the weather before receiving finish coats.

B. The goal of any painting project shall be to provide a very high quality, durable paint finish, while retaining as much of the paint history as possible and protecting the historic substrate from any unnecessary or adverse damage.

C. Take all necessary precautions to protect building elements and finishes from damage by precipitation during work of this Section.

D. Every effort shall be made to accommodate the reasonable needs of the Historic David Greenleaf House site personnel in relation to scheduling.

E. Every effort shall be made to protect any and all landscaping from harm.

F. Do not apply material when temperature of surface and surrounding areas is below 50 degrees F, unless otherwise permitted by manufacturer's instructions.

G. Do not apply paint in snow, rain, fog or mist; or when the relative humidity exceeds 85%; or to damp or wet surfaces. The moisture content of the surfaces to be painted must be 13% or less. Moisture content will be tested in several areas of each elevation prior to the application of any paint materials.

H. All manufacturer's printed instructions are to be followed unless otherwise instructed in this document or by the Owner directly.

I. Perform all work that disturbs lead-containing paint, handle all material that involves lead-containing paint, and transport and dispose of all lead-containing paint and residue in compliance with all applicable federal, state and local laws containing paint and residue in compliance with all applicable federal, state and local laws and regulations for identification, removal, labeling, handling, containerization, transportation, and disposal of lead-containing material.

J. All materials shall comply with fire safety standards. Take all necessary precautions to prevent fire and spread of fire.

K. The site shall be kept clean and free of debris, paint chips, and all equipment; the work area shall be cleaned in an orderly fashion before work completion daily.

3.2 EVALUATE SUBSTRATE

A. Thoroughly assess substrate to determine if any carpentry repairs are necessary prior to beginning the painting project.

B. Notify Owner if repairs are suggested and identify all locations for review.

C. Contractor should not perform any repairs prior to consultation with Owner.

3.3 CLEANING

A. When cleaning the gentlest means possible should always be utilized. Always test a small area of the cleaning agent prior to washing the entire surface. Owner must approve condition prior to proceeding. Clean surfaces of dirt and mildew if needed by the following methods:

1. Attempt to use water at a pressure less than 60 psi (garden hose) and a natural bristle brush before upgrading to a harsher method.

2. If stubborn biological staining exists, a 3:1 hot water:bleach mixture should be used. The mixture can be applied by handheld compression tank sprayer, or by hand with a natural brush. All areas to be treated must be thoroughly rinsed with clean water at a pressure of less than 60 psi before proceeding further. Surfaces must be allowed to dry at least 48 hours before any material application.

3. The use of tri-sodium-phosphate (TSP) or other products containing phosphates or sodium (soluble salts) is forbidden.

4. Power washing is not permitted.

B. If difficulty washing the surface is encountered, confer with Owner to discuss further options.

C. Take all necessary precautions to protect building elements and finishes from damage by precipitation during work of this Section.

3.4 PAINT REMOVAL

A. Mechanical: Scrape with hand tools all other surfaces exhibiting areas of loose or peeling paint, and areas of adhesion failure. Feather all rough edges with by hand sanding to provide a smooth transition between paint layers and substrate. As it is imperative that the substrate be free of all marks from sanding and tools, a disc sander will not be considered. Random orbital or palm sanders may be used, only following agreement by the owner, so long as no or very minimal removal of existing substrate results. Agreement by the owner will be contingent upon an accepted sample of the orbital sanding. Any sander must have attached dust collector.

B. Heat: If areas have been specified to be stripped bare of paint, this will be accomplished by use of an infrared heater or steam. No heat guns will be used. Infrared heat will be used according to manufacturer's instructions and with care never to overheat wood. Historic David Greenleaf House shall only approve stripping wood on buildings where paint analysis has been performed. Should a noticeably complete collection of paint layers be discovered during work, notify the Owner to allow for sample collection.

C. Chemical: Chemical strippers shall be reserved for use in special situations, and shall never be used unless specified according to the scope of work of the contract documents. No methylene chloride strippers shall be used. Chemical strippers shall never be used in situ.

3.5 WOOD TREATMENT

A. If Contractor believes an area requires wood consolidation, review area with Owner for approval. If a consolidant must be applied, a non-styrene based two- part epoxy should be used. All epoxies must be approved by Owner.

B. If an application of wood rejuvenator is deemed necessary prior to an application of paint, Historic David Greenleaf House will determine or approve the product to be used. Products are to be applied according to manufacturer's directions and surfaces must be allowed to dry a minimum of 24-48 hours.

3.6 PRIMING

A. Primer shall be of type specified in the "Materials" section of this document and shall be compatible make and composition as finish paint. No substitutions will be accepted without written approval from Owner.

B. Apply primer in accordance with manufacturer's directions. Materials to be applied by method best suited for application: brush, roller, or spray. All paint to be finished by brush application* (*unless a more modern technique is historically appropriate).

C. Apply each coat at not less than recommended spreading rate to provide the dry film millimeter thickness specified by the manufacturer for each paint coating.

D. Allow at least 4-24 hours dry time (depending on manufacturer's specification) before proceeding with any additional paint application. Coating failure may result by application of additional paint over non-dry film.

E. Apply additional coating where undercoats, stains, or other conditions show through paint film, until uniform finish color is achieved.

F. Exposed nail heads to be spot primed with a rust inhibitor.

G. New wood shall be primed on all sides (especially end grain) prior to installation or fabrication of structure. All wood to be installed with ground contact will be treated with wood preservative approved by Owner.

H. All joints or gaps around doors, windows, or vertical joints of siding where water invasion may occur are to be filled with an approved latex caulk, not to be applied until primer coating is dry. Silicone caulks are not approved. Never caulk horizontal clapboard laps.

I. All areas indicating stains due to corrosion of hardware shall be, pending Owner approval, removed, properly labeled and stored in an agreed-upon location on- site. Rust and corrosion shall be removed by wire brush. All surfaces are to be primed with a rust

inhibiting primer, and reinstalled after finish painting, if possible.

3.7 FINISH PAINT

A. Upon completion of previous treatments, inspect all surfaces prior to paint application. Lightly hand sand rough or fuzzed areas. Care should be taken not to expose substrate or re-priming will be necessary.

B. Apply as specified in contract documents and according to manufacturer's directions; film thickness as per material specifications. Upon completion of coat, inspect all surfaces and allow to dry before applying a second coating.

C. Apply additional paint coating where undercoats, stains, or other conditions show through paint film, until uniform finish color is achieved.

D. Apply a coat of finish paint to the Owner provided sample stick for every coat of finish paint applied to the surface. Label the sample stick on the back with the following information:

1. Project name; paint manufacturer; paint type; color name; color formula; sheen; vendor; number of coats; date of application & Contractor's name.

3.8 CLEAN-UP

A. Perform operations so as to keep work areas and premises clean, and free from accumulation of scrap materials, debris and other surplus material (at the end of every workday).
B. Remove all debris from site and dispose of properly in accordance with all EPA regulations. Recycle debris when possible.
C. No materials or debris will be permitted to drop free, but shall be removed by use of material hoists, rubbish chutes, or other method approved by the Owner.
D. No materials or debris will be permitted to be passed through the finished interior without proper protection in a manner approved by the Owner.
E. The landscape is to be left in as-found or better condition upon the completion of the project.

END OF SECTION

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SECTION 099123

INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following interior substrates:
   1. Wood.
   2. Gypsum board.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1.3 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

   1. Paint: 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in other Part 2 articles for the paint category indicated.

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:

   1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.

2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. Colors: As selected by Architect from manufacturer's full range.

2.3 PRIMERS/SEALERS

A. Primer Sealer, Latex, Interior: MPI #50.

1. Sherwin Williams; Drywall Primer.

2.4 WATER-BASED PAINTS

A. Latex, Interior, (Gloss Level 4): MPI #43. Walls

1. Sherwin Williams; Duration, Satin finish.

B. Latex, Interior, Semi-Gloss, (Gloss Level 5): MPI #54. Wood doors and trim

1. Sherwin Williams; Duration, Semi-gloss finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
1. Gypsum Board: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 CLEANING AND PROTECTION

A. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

B. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 INTERIOR PAINTING SCHEDULE

A. Wood Substrates: Including doors.
1. Latex System:

a. Prime Coat: Primer sealer, latex, interior, MPI #50.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, (Gloss Level 5), MPI #54.

B. Gypsum Board Substrates:

1. Latex System:

a. Prime Coat: Primer sealer, latex, interior, MPI #50.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, (Gloss Level 4), MPI #43.

END OF SECTION 09910

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SECTION 15010

BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. General: Materials and methods for performance of all mechanical work.

B. Provide complete and operational mechanical systems including, but not limited to, all required materials, parts, equipment, labor, tools, and accessories.

1.2 SUMMARY

A. This Section includes general administrative and procedural requirements for mechanical installations.
   1. Codes & standards.
   2. Submittals.
   3. Quality control.
   4. Permits, fees, and inspections.
   5. Schedule and sequence.
   6. Project and site conditions.
   7. Delivery, storage, and handling.
   8. Record documents.
   9. Operation and Maintenance manuals.
   10. Warranties and guaranties.
   11. Rough-ins.
   12. Mechanical installations.
   13. Cutting, patching, and firestopping.
   14. Mechanical indentification.

1.3 CODES AND STANDARDS

A. Except as modified by governing codes, comply with applicable provisions and recommendations of the following:

   1. ANSI Standards.
   2. Owner's Insurance Company.
   3. Current Massachussets Laws and Statutes.
   4. Requirements of the Federal Housing and Urban Renewal Department (ie. HUD).

1.4 SUBMITTALS

A. Increase, by the quantity listed below, the number of mechanical related shop drawings, product data, and samples submitted, to allow for required distribution.

1. Shop Drawings: Initial Submittal: 1 additional blue- prints.
2. Product Data: 1 additional copy of each item.
3. Samples: 1 addition as set.

B. Additional copies may be required by individual sections of these Specifications.

C. Shop Drawings:

1. Submit for review, detailed shop drawings and product data of all the equipment and material required to complete the work. No material or equipment may be delivered to the jobsite or installed until accepted shop drawings for the particular material or equipment have been approved by the Owner or his authorized representative.

2. Failure to submit shop drawings in ample time for checking will not entitle Contractor to claim extension of Contract time, or increase in contract cost.

3. The proposed piping layout for the Boiler system is required.

D. Tests & Certificates:

1. As specified in other sections.

1.5 QUALITY ASSURANCE

A. Drawings:

1. Drawings are diagrammatic. They indicate the general arrangement of systems and work included in the contract. Drawings are not to be scaled. Site and Architectural drawings and details shall be examined for exact location of fixtures and equipment. Where they are not definitely located, this information shall be obtained from the Owner or authorized representative.

2. Surveys and Measurements:

a. Before submitting bid, visit site, become familiar with conditions under which work will be installed. Contractor will be held responsible for assumptions, omissions, and errors made as a result of failure to become familiar with site and contract documents.

b. Base all measurements, both horizontal and vertical, from established bench marks. All work shall agree with established lines and levels. Verify all measurements at site and check the correctness of same.

c. Notify the Engineer promptly of discrepancies between actual measurements and those indicated, which prevents following good practice or intent of drawings and specifications. Do not proceed with work until Contractor has received instructions from Engineer.

B. Labor:

1. Cooperation with Other Trades:

a. Give full cooperation to other trades; furnish in writing to General Contractor, with copies to the Engineer, information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.

b. Where work will be installed in close proximity to, or will interfere with work of other trades, assist in working out space conditions to make a satisfactory adjustment. If directed by the Engineer, prepare composite working drawings and sections at a suitable scale not less than 1/4" = 1'0", clearly showing how work is to be installed in relation to the work of other trades. If work under this division is installed before coordinating with other trades, or to cause any interference with work of other trades, make necessary changes to correct the condition without additional cost.

c. Furnish to other trades all necessary templates, patterns, setting plans, and shop details for the proper installation of work and for the purpose of coordinating adjacent work.

2. Materials & Workmanship:

a. Materials and apparatus required for the work shall be new and of first class quality. Furnished, delivered, erected, connected and finished in every detail. Select and arrange to fit properly into the building spaces. Where no specific kind or quality of material is given, furnish first class standard article as accepted by Engineer.

b. Furnish the services of an experienced superintendent who shall be in constant charge of the work, together with skilled craftsmen and labor required to unload, transfer, erect, connect-up, adjust, start, operate, and test each system.

c. All equipment and materials to be installed with the acceptance of the Engineer in accordance with the recommendations of the manufacturer. This includes the performance of such test as the manufacturer recommends.

3. Protection of Materials:

a. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.

b. Welding: Before any welding is performed, submit a copy of the Welding Procedure Specification (WPS) together with the Procedure Qualification Record a required by Section IX of the ASME Boiler and Pressure Vessel Code.

1) Before any welder performs any welding, submit a copy of the Manufacturer's Record of Welder or Welding Operator Qualification Tests as required by Section IX of the ASME Boiler and Pressure Vessel Code. The letter or symbol (as shown on the qualification test form) shall be used to identify the work of that welder and shall be affixed, in accordance with appropriate construction code, to each completed weld.
2) The types and extent of non-destructive examinations required for pipe welds are shown in Table 136.4 of the Code for Pressure Piping, ASNI/ASME B31.1.

c. Manufacturer's Recommendations: Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Engineer prior to the installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

1.6 PERMITS, FEES, & INSPECTIONS

A. Give all necessary notices, obtain and pay for all permits, and pay all government sales taxes, fees, and other costs, including utility connections or extensions in connection with work. File necessary approvals of governmental departments having jurisdiction. Obtain required certificates of inspection for work and deliver a copy to the Owner or his authorized representative before requesting acceptance for final payment.

1.7 SCHEDULE & SEQUENCE

A. Temporary Services:
   1. Refer to the General Conditions and Special Conditions for a full description of the temporary services to be provided.

B. Temporary Openings:

   1. Ascertain from examination of the drawings any special temporary openings in the building required for the admission of apparatus provided under this Division. Notify the Owner accordingly. Contractor shall assume all costs of providing such openings thereafter.

C. Sequencing:

   1. Contractor shall coordinate sequence of work with owner's representative.

1.8 PROJECT & SITE CONDITIONS

A. Cutting, Patching, and Firestopping:

   1. Furnish all cutting, drilling and patching. Furnish sketches showing the locations and sizes of openings, chases, etc., required for the installation of work. Furnish the Contractor with an approximation of the number and size of openings, chases, etc., required.

B. Waterproofing:

   1. Where any work pierces existing waterproofing, re-waterproof. The method of installation to be reviewed by Owner or his authorized representative before work is done. Furnish all sleeves, caulking, and flashing required to make openings watertight.

C. Fireproofing:

   1. Where any work penetrates a fire rated assembly, provide UL listed, firestopping with hourly rating equal to that of the penetrated assembly. Fireproofing shall be compatible with the pipe or equipment doing the penetration so that fire rating of the assembly is maintained.

1.9 DELIVERY, STORAGE, & HANDLING

A. Delivery & Receipt:

1. Contractor is responsible for the delivery and storage of all materials, parts, equipment, etc. required for this project.

B. Storage:

1. The Contractor shall store all material, parts, and equipment required for this project in accordance with supplier's and manufacturer's recommendations, and Owner's requirements.

C. Handling, Hoisting, Rigging, & Scaffolding:

1. Furnish all scaffolding, rigging, hoisting, and services necessary for erection and delivery into the premises of any equipment and apparatus furnished under this Division. Remove same from premises when no longer required.

1.10 RECORD DOCUMENTS

A. Maintain at the job site a record set of drawings on which any changes in location of equipment, piping, ducts, valves, cleanouts, panels, and major conduits shall be recorded. These shall be clearly marked on a clean set of prints at the completion of work for record drawings and turned over to the Owner.

B. Prepare record documents in accordance with the requirements below:

1. Mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, tanks, etc.). Valve location diagrams, complete with valve tag chart.

2. Equipment locations (exposed and concealed), dimensioned from prominent building lines.

3. Approved substitutions, Contract Modifications, and actual equipment and materials installed.

4. Contract Modifications, actual equipment and materials installed.

1.11 OPERATION & MAINTENANCE MANUALS FOR MECHANICAL SYSTEMS

A. Bind Operation & Maintenance Manual for Mechanical System in a hard-backed binder. Spline of each binder shall have the following lettering done in typeset:

OPERATION

AND
MAINTENANCE
MANUAL
For

ADA AND CODE COMPLIANCE
AT
EGREMONT FREE LIBRARY

1. Provide a master index at beginning of Manual showing items included. Use plastic tab indexes for sections of Manual.

2. First section shall consist of name, address, and phone number of Architect, Mechanical & Electrical Engineers, General Contractor and Mechanical, Plumbing, Sheet Metal, Refrigeration, Temperature Control & Electrical Contractors. Also include a complete list of equipment installed with name, address, and phone number of vendor.

3. Provide section for each type of item of equipment.

4. Submit three copies of Operation & Maintenance Manual to Engineer for his approval. Use one of these approved copies during final inspection and leave with building maintenance personnel.

B. Include descriptive literature (Manufacturer's catalog data) of each manufactured item. Literature shall show capacities and size of equipment used and be marked indicating each specific item with applicable data underlined.

C. Operating instructions shall include:

1. General description of each mechanical system.

2. Step by step procedure to follow in putting each piece of mechanical equipment into operation.

3. Provide schematic control diagrams for each separate fan system, refrigeration system, heating system, control panel, etc. Each diagram shall show locations of start-stop switches, insertion thermostats, room thermostats, thermometers, firestats, pressure gauges, automatic valves, and refrigeration accessories. Mark correct operating setting for each control instrument on these diagrams.

4. Provide diagram for electrical control system showing wiring of related electrical control items such as firestats, fuses, interlock, electrical switches, and relays.

5. Provide drawing of each temperature control panel system.

D. Prepare maintenance manuals to include the following information for equipment items:

1. Manufacturer's maintenance equipment installed in Project. Instructions shall include name of vendor, installation instructions, parts numbers & lists, operation instructions of equipment and maintenance & lubrication instructions.

2. Summary list of mechanical equipment requiring lubrication showing name of equipment, location and type, and frequency of lubrication.

3. List of mechanical equipment used indicating name, model, serial number, and name plate data of each item together with number and name associated with each system item.

4. List spare parts and quantities to be maintained in ready inventory at project site.

5. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.

6. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.

7. Servicing instructions and lubrication charts and schedules.

E. Air Balance and Water Balance Test Run Reports

1.12WARRANTIES AND GUARANTIES

A. Guarantee all material and workmanship under this Division for a period of one year, from the date of final acceptance by the Owner.

B. During guarantee period, all defects developing through materials and/or workmanship shall be replaced immediately without expense to the owner. Make such repairs or replacements to the satisfaction of the Owner.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. As specified under other related sections.

B. As specified on drawings.

2.2 MATERIALS

A. As specified under other related sections.

B. As specified on drawings.

2.3 EQUIPMENT DEVIATIONS

A. Where the Contractor proposed to use an item of equipment other than that specified or detailed on the drawings which requires the redesign of the structure, partitions, foundations, piping, wiring or any other part of the mechanical layout, all such redesign, and all new drawings and detailing required therefore, shall be prepared at the Contractor's expense and are subject to the review and approval of the Engineer. Owner reserves the right to have the Engineer prepare any redesign work.

B. Where such accepted deviation requires a different quantity and arrangement of materials or equipment from that specified or indicated on the drawings, the Contractor will provide additional equipment and materials required at no additional cost to the Owner.

C. When equipment or methods deviate from original plans or specifications, the Contractor must submit a written request to deviate to the Engineer. At a minimum the request will address the following:

- equipment which is different than specified
- name and data related to the proposed deviation
- reason for deviation
- advantageous or disadvantageous to the Owner
- credit or increase in cost to the Owner
- guarantees or warranties offered (if any)
- acceptance of liability for equivalent performance.

2.4 MANUFACTURER'S IDENTIFICATION

A. Attach manufacturer's nameplate, name, trademark and address permanently to equipment and material furnished under this Division. Nameplate of a Contractor or Distributor is not acceptable.

2.5 ELECTRICAL REQUIREMENTS

A. Motors:

1. Electric motors furnished as a component part of equipment furnished under this Division shall conform to the requirements of IEEE, NEMA, UL, ANSI C50, and ANSI CI. Motors to be suitable for required load, duty voltage, phase, frequency, service and location.

2. Motors to be suitable for continuous duty at rated horsepower with temperature rise not to exceed 40oC for dripproof motors, 50oC for splashproof motors, and 55oC for totally enclosed motors. Motors to be capable of withstanding momentary overloads of 25 percent without injurious overheating.

3. Motors to have nameplates giving Manufacturer's name, serial number, horsepower, speed and current characteristics.

4. Motor leads shall be permanently identified and supplied with connectors.

5. Each motor to be selected for quiet operation in accordance with NEMA standards.

B. Motor Starters:

1. Electric motor starters shall conform to requirements of IEEE, NEMA, UL, ANSI, CI and shall be suitable for the required load, duty, voltage, phase, frequency, service, and location.

2. When interlocking or automatic control of single phase motors is required, motors to be furnished with full voltage, across-the-line starters.

C. Connections:

1. All wiring to be furnished and installed under Division 16.

2. Power wiring to be furnished and installed complete from power source to motor or equipment junction box, including power wiring through the starters. Starters not factory mounted on equipment shall be furnished and installed under Division 16.

2.6 MECHANICAL REQUIREMENTS

A. Bases & Supports:

1. Provide necessary foundations, supports, pads, bases and piers required for equipment, tanks, and other equipment furnished under this Division. Submit drawings to Engineer for review before purchase, fabrication, or construction.

2. Equipment where foundations are required, provide 3500 psi concrete pads. Extend pads six (6) inches beyond machine base in all directions with top edge chamfered. Insert steel dowel rods into floors to anchor pads. Submit shop drawings of foundations and pads to Owner for review before construction.

3. Construction of foundations, supports, pads, bases, and piers where mounted on the floor to be of the same materials and same quality of finish as the adjacent surrounding flooring material.

B. Lubrication:

1. Lubricate all equipment having moving parts and requiring lubrication according to manufacturer's recommendations prior to testing and operation. Equipment discovered to have been operated before lubrication is subject to rejection and replacement at no cost to the Owner.

C. Accessibility:

1. Be responsible for the sufficiency of the size of shafts and chases, adequate clearance in double partitions and hung ceilings for proper installation of work. Cooperate with the Contractor and other contractors whose work is in the same space. Advise the Contractor of requirements. Such spaces and clearances shall be kept to the minimum size required.

2. Locate all equipment which requires servicing in fully accessible positions. Equipment shall include but not be limited to, valves, traps, clean-outs, motors, controllers, switchgear, and drain points. Any change shall be submitted to the Owner or his authorized representative for review.

D. Connection to Existing Structures:

1. Before cutting, drilling, attaching, or any work involving building elements, coordinate work with others and Owner to avoid damage to building elements.

2.7 FIRESTOPPING

A. Firestopping shall be UL listed, and tested in accordance with ASTM E814, E119, and E84.

B. Hourly rating shall be equal to that of the assembly being penetrated.

C. Firestopping shall be compatible with pipe or equipment penetrating the assembly fire rating of the assembly must be maintained.

PART 3 - EXECUTION

3.1 ROUGH-IN

A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

B. Refer to equipment specifications in Divisions 2 through 16 for rough-in requirements.

3.2 MECHANICAL INSTALLATIONS

A. General: Sequence, coordinate, and integrate the various elements of mechanical systems, materials, and equipment. Comply with the following requirements:

1. Coordinate mechanical systems, equipment, and materials installation with other building components.

2. Verify all dimensions by field measurements.

3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for mechanical installations.

4. Coordinate the installation of required supporting devices and sleeves to be set in structural components, as they are constructed.

5. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work.

6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.

7. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

8. Install systems, materials, and equipment to conform with approved submittal data, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Engineer.

9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.

10. Install mechanical equipment to facilitate servicing, 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.

11. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

3.3 CUTTING, PATCHING, AND FIRESTOPPING

A. General: Perform cutting and patching in accordance with the following requirements apply:

1. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.

B. Perform cutting, fitting, and patching of mechanical equipment and materials required to:

1. Remove and replace defective Work.
2. Remove and replace Work not conforming to requirements of the Contract Documents.
3. Remove samples of installed Work as specified for testing.
4. Install equipment and materials in existing structures.
5. Upon written instructions from the Engineer, uncover and restore Work to provide for Engineer observation of concealed Work.

C. Cut, remove and legally dispose of selected mechanical equipment, components, and materials as indicated, including but not limited to removal of mechanical piping, heating units, plumbing fixtures and trim, and other mechanical items made obsolete by the Work.

D. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

1. Patch finished surfaces and building components using materials specified for the original installation and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.

E. Firestop all pipe and equipment that penetrates fire rated assembly. Follow manufacturer's instructions to provide fire rating equal to that of the assembly.

3.4 FIELD QUALITY CONTROL

A. Perform field tests as specified under other sections.

B. Arrange for local inspection authorities to inspect work performed prior to burial, closing-in behind wall and above ceiling or encase in concrete. Also arrange for final inspection of work and obtain Final Inspection Certificate before final inspection by Owner or his representative.

3.5 PAINTING

A. See Division 9 for painting in finished areas.

B. Materials shipped to the job site under this Division to have prime coat and standard manufacturer's finish.

3.6 TESTING & BALANCING: See Section 15990

3.7 EQUIPMENT IDENTIFICATION

A. Valves charts and tags

1. All valves shall be provided with valve tags secured to the valve stems or handles with brass chains or S hooks. Tags shall be based on Seton Nameplate Co. (Numbers and letter identification shall indicate service where valve is located. Tags shall be 1-3/8" diameter.

2. Furnish two (2) valve charts, one framed under glass and one unframed copy for record files. Charts shall indicate system designation, valve number, service, and location of valve. Use actual room names on charts.

3.8 CLEANING

A. Any part of a system stopped by foreign matter after being placed in operation, to be disconnected, cleaned, and reconnected to locate and remove obstructions. Work damaged in the course of removing obstructions will be repaired or replaced at no additional cost to the Owner.

B. Cap all pipes to protect against entrance of foreign matter.

C. Remove rubbish, debris, and excess materials. Remove oil and grease stains on floor areas.

END OF SECTION 15010

SECTION 15050

BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following basic mechanical materials and methods to complement other Division 15 Sections.

1. Piping materials and installation instructions common to most piping systems.
2. Concrete equipment base construction requirements.
3. Equipment nameplate data requirements.
4. Nonshrink grout for equipment installations.
5. Field-fabricated metal and wood equipment supports.
6. Installation requirements common to equipment specification sections.
7. Mechanical demolition.
8. Cutting and patching.
9. Touch-up painting and finishing.

B. Pipe and pipe fitting materials are specified in piping system Sections.

1.3 DEFINITIONS

A. Pipe, pipe fittings, and piping include tube, tube fittings, and tubing.

B. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below the roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.

C. Exposed Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

D. Exposed Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

E. Concealed Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

F. Concealed Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.4 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract.

B. Product data for following piping specialties:
   1. Mechanical sleeve seals.
   2. Identification materials and devices.

C. Samples of color, lettering style, and other graphic representation required for each identification material and device.

D. Shop drawings detailing fabrication and installation for metal and wood supports and anchorage for mechanical materials and equipment.

E. Coordination drawings for access panel and door locations.

F. Prepare coordination drawings to a 1/4 inch equals 1 foot scale or larger. Detail major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Show space requirements for installation and access. Show where sequence and coordination of installations are important to the efficient flow of the Work. Include the following:

   1. Proposed locations of piping, ductwork, equipment, and materials. Include the following:

      a. Planned piping layout, including valve and specialty locations and valve stem movement.
      b. Planned duct systems layout, including elbows radii and duct accessories.
      c. Clearances for installing and maintaining insulation.
      d. Clearances for servicing and maintaining equipment, including space for equipment disassembly required for periodic maintenance.
      e. Equipment service connections and support details.
      f. Exterior wall and foundation penetrations.
      g. Fire-rated wall and floor penetrations.
      h. Sizes and location of required concrete pads and bases.

   2. Scheduling, sequencing, movement, and positioning of large equipment into the building during construction.

   3. Floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.

4. Reflected ceiling plans to coordinate and integrate installations, air outlets and inlets, light fixtures, communication systems components, sprinklers, and other ceiling-mounted items.

G. Welder certificates signed by Contractor certifying that welders comply with requirements specified under "Quality Assurance" Article of this Section.

1.5 QUALITY ASSURANCE

A. Qualify welding processes and operators for structural steel according to AWS D1.1 "Structural Welding Code - Steel."

B. Qualify welding processes and operators for piping according to ASME "Boiler and Pressure Vessel Code," Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions of ASME B31 Series "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for the welding processes involved and that certification is current.

C. ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

D. Equipment Selection: Equipment of greater or larger power, dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. No additional costs will be approved for these increases, if larger equipment is approved. If minimum energy ratings or efficiencies of the equipment are specified, the equipment must meet the design requirements and commissioning requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end-caps. Maintain end-caps through shipping, storage, and handling to prevent pipe-end damage and prevent entrance of dirt, debris, and moisture.

B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. When stored inside, do not exceed structural capacity of the floor.

C. Protect flanges, fittings, and piping specialties from moisture and dirt.

D. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 SEQUENCING AND SCHEDULING

A. Coordinate mechanical equipment installation with other building components.

B. Arrange for chases, slots, and openings in building structure during progress of construction, to allow for mechanical installations.

C. Coordinate the installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.

D. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning prior to closing in the building.

E. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.

F. Coordinate requirements for access panels and doors where mechanical items requiring access are concealed behind finished surfaces.

G. Coordinate installation of identifying devices after completion of covering and painting, where devices are applied to surfaces. Install identifying devices prior to installation of acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 PIPE AND PIPE FITTINGS

A. Refer to individual piping system specification Sections for pipe and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.2 JOINING MATERIALS

A. Refer to individual piping system specification Sections in Division 15 for special joining materials not listed below.

B. Pipe Flange Gasket Materials: Suitable for the chemical and thermal conditions of the piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness, except where thickness or specific material is indicated.

a. Full-Face Type: For flat-face, Class 125 cast-iron and cast-bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250 cast-iron and steel flanges.

2. ASME B16.20 for grooved, ring-joint, steel flanges.
3. AWWA C110, rubber, flat face, 1/8-inch thick, except where other thickness is indicated; and full-face or ring type, except where type is indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, except where other material is indicated.

D. Plastic Pipe Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, except where other type or material is indicated.

E. Solder Filler Metal: ASTM B 32.

1. Alloy Sn95 or Alloy Sn94: Tin (approximately 95 percent) and silver (approximately 5 percent), having 0.10-percent lead content.
2. Alloy Sn50: Tin (50 percent) and lead (50 percent).
3. Alloy E: Tin (approximately 95 percent) and copper (approximately 5 percent), having 0.10-percent maximum lead content.
4. Alloy HA: Tin-antimony-silver-copper-zinc, having 0.10-percent maximum lead content.
5. Alloy HB: Tin-antimony-silver-copper-nickel, having 0.10-percent maximum lead content.
6. Alloy Sb5: Tin (95 percent) and antimony (5 percent), having 0.20-percent maximum lead content.

F. Brazing Filler Metals: AWS A5.8.

1. BCuP Series: Copper-phosphorus alloys.
2. BAg1: Silver alloy.

G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

H. Solvent Cements: Manufacturer's standard solvents complying with the following:

1. Acrylonitrile-Butadiene-Styrene (ABS): ASTM D 2235.
2. Chlorinated Poly(Vinyl Chloride) (CPVC): ASTM F 493.
3. Poly(Vinyl Chloride) (PVC): ASTM D 2564.
4. PVC to ABS Transition: Made to requirements of ASTM D 3138, color other than orange.

I. Plastic Pipe Seals: ASTM F 477, elastomeric gasket.

J. Flanged, Ductile-Iron Pipe Gasket, Bolts, and Nuts: AWWA C110, rubber gasket, carbon

steel bolts and nuts.

K. Couplings: Iron body sleeve assembly, fabricated to match outside diameters of plain-end, pressure pipes.

1. Sleeve: ASTM A 126, Class B, gray iron.
2. Followers: ASTM A 47, Grade 32510 or ASTM A 536 ductile iron.
3. Gaskets: Rubber.
4. Bolts and Nuts: AWWA C111.
5. Finish: Enamel paint.

2.3 PIPING SPECIALTIES

A. Escutcheons: Manufactured wall, ceiling, and floor plates; deep-pattern type, where required to conceal protruding fittings and sleeves.

1. Inside Diameter: Closely fit around pipe, tube, and insulation of insulated piping.
2. Outside Diameter: Completely cover opening.
3. Cast Brass: One-piece, with set-screw.
   a. Finish: Rough brass.
   b. Finish: Polished chrome plate.

4. Cast Brass: Split casting, with concealed hinge and set-screw.
   a. Finish: Rough brass.
   b. Finish: Polished chrome plate.

5. Stamped Steel: One-piece, with set-screw and chrome plated finish.
6. Stamped Steel: One-piece, with spring clips and chrome plated finish.
7. Stamped Steel: Split plate, with concealed hinge, set-screw, and chrome plated finish.
8. Stamped Steel: Split plate, with concealed hinge, spring clips, and chrome plated finish.
9. Stamped Steel: Split plate, with exposed-rivet hinge, set-screw, and chrome plated finish.
10. Stamped Steel: Split plate, with exposed-rivet hinge, spring clips, and chrome plated finish.
11. Cast-Iron Floor Plate: One-piece casting.

B. Dielectric Fittings: Assembly or fitting having insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion.

1. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld neck end types and matching piping system materials.
2. Insulating Material: Suitable for system fluid, pressure, and temperature.
3. Dielectric Unions: Factory-fabricated, union assembly, for 250 psig minimum working pressure at 180 deg F temperature.

4. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150 or 300 psig minimum pressure to suit system pressures.
5. Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

    a. Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig minimum working pressure to suit system pressures.

6. Dielectric Couplings: Galvanized-steel coupling, having inert and non-corrosive, thermoplastic lining, with threaded ends and 300 psig minimum working pressure at 225 deg F temperature.
7. Dielectric Nipples: Electroplated steel nipple, having inert and non-corrosive, thermoplastic lining, with combination of plain, threaded, or grooved end types and 300 psig working pressure at 225 deg F temperature.

C. Mechanical Sleeve Seals: Modular, watertight, mechanical type. Components include interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve. Connecting bolts and pressure plates cause rubber sealing elements to expand when tightened.

D. Sleeves: The following materials are for wall, floor, slab, and roof penetrations:

1. Steel Sheet-Metal: 24 gage or heavier, galvanized sheet metal, round tube closed with welded longitudinal joint.

2. Steel Pipe: ASTM A 53, Type E, Grade A, Schedule 40, galvanized, plain ends.

3. Cast-Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, having plain ends and integral water stop, except where other features are specified.

4. Wall Penetration Systems: Wall sleeve assembly, consisting of housing, gaskets, and pipe sleeve, with 1 mechanical-joint end conforming to AWWA C110 and 1 plain pipe-sleeve end.

    a. Penetrating Pipe Deflection: 5 percent without leakage.
    b. Housing: Ductile-iron casting having waterstop and anchor ring, with ductile-iron gland, steel studs and nuts, and rubber gasket conforming to AWWA C111, of housing and gasket size as required to fit penetrating pipe.
    c. Pipe Sleeve: AWWA C151, ductile-iron pipe.
    d. Housing-to-Sleeve Gasket: Rubber or neoprene, push-on type, of manufacturer's design.

5. Cast-Iron Sleeve Fittings: Commercially-made, sleeve having integral clamping flange, with clamping ring, bolts, and nuts for membrane flashing.

a. Underdeck Clamp: Clamping ring with set-screws.

6. PVC Plastic: Manufactured, permanent, with nailing flange for attaching to wooden forms.

7. PE Plastic: Manufactured, reusable, tapered, cup-shaped, smooth outer surface, with nailing flange for attaching to wooden forms.

2.4 IDENTIFYING DEVICES AND LABELS

A. General: Manufacturer's standard products of categories and types required for each application as referenced in other Division 15 Sections. Where more than single type is specified for listed application, selection is Installer's option, but provide single selection for each product category.

B. Equipment Nameplates: Metal nameplate with operational data engraved or stamped; permanently fastened to equipment.

1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data.
2. Location: An accessible and visible location.

C. Stencils: Standard stencils, prepared for required applications with letter sizes conforming to recommendations of ASME A13.1 for piping and similar applications, but not less than 1-1/4-inches-high letters for ductwork and not less than 3/4-inch-high letters for access door signs and similar operational instructions.

1. Material: Fiberboard.
2. Material: Brass.
3. Stencil Paint: Standard exterior type stenciling enamel; black, except as otherwise indicated; either brushing grade or pressurized spray-can form and grade.
4. Identification Paint: Standard identification enamel of colors indicated or, if not otherwise indicated for piping systems, comply with ASME A13.1 for colors.

D. Snap-On Plastic Pipe Markers: Manufacturer's standard pre-printed, semi-rigid snap-on, color-coded pipe markers, conforming to ASME A13.1.

E. Pressure-Sensitive Pipe Markers: Manufacturer's standard pre-printed, permanent adhesive, color-coded, pressure-sensitive vinyl pipe markers, conforming to ASME A13.1.

F. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white (letter color) melamine subcore, except when other colors are indicated.

1. Fabricate in sizes required for message.
2. Engraved with engraver's standard letter style, of sizes and with wording to match equipment identification.
3. Punch for mechanical fastening.
4. Thickness: 1/16 inch, except as otherwise indicated.
5. Thickness: 1/8 inch, except as otherwise indicated.
6. Thickness: 1/16 inch, for units up to 20 square inches or 8-inches long; 1/8 inch for larger units.
7. Fasteners: Self-tapping stainless-steel screws or contact-type permanent adhesive.

G. Plastic Equipment Markers: Laminated-plastic, color-coded equipment markers. Conform to following color code:

1. Yellow: Heating equipment and components.
2. Brown: Energy reclamation equipment and components.
3. Blue: Equipment and components that do not meet any of above criteria.
4. For hazardous equipment, use colors and designs recommended by ASME A13.1.
5. Nomenclature: Include following, matching terminology on schedules as closely as possible:

   a. Name and plan number.
   b. Equipment service.
   c. Design capacity.
   d. Other design parameters such as pressure drop, entering and leaving conditions, and rpm.

6. Size: Approximate 2-1/2 by 4 inches for control devices, dampers, and valves; and 4-1/2 by 6 inches for equipment.

H. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in mechanical identification, with corresponding designations indicated. Use numbers, lettering, and wording indicated for proper identification and operation/maintenance of mechanical systems and equipment.

1. Multiple Systems: Where multiple systems of same generic name are indicated, provide identification that indicates individual system number as well as service such as "Boiler No. 3," "Air Supply No. 1H," or "Standpipe F12."

2.5 GROUT

A. Nonshrink, Nonmetallic Grout: ASTM C 1107, Grade B.

1. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000 psi, 28-day compressive strength.

3. Packaging: Premixed and factory-packaged.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

A. General: Install piping VALVES as described below, except where system Sections specify otherwise. Individual piping system specification Sections in Division 15 specify piping installation requirements unique to the piping system.

B. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate general location and arrangement of piping systems. Install piping as indicated, except where deviations to layout are approved on coordination drawings.

C. Install piping at indicated slope.

D. Install components having pressure rating equal to or greater than system operating pressure.

E. Install piping free of sags and bends.

F. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, except where indicated.

G. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.

H. Install piping to allow application of insulation plus 1-inch clearance around insulation.

I. Locate groups of pipes parallel to each other, spaced to permit valve servicing.

J. Install fittings for changes in direction and branch connections.

K. Install couplings according to manufacturer's printed instructions.

L. Install pipe escutcheons for pipe penetrations of concrete and masonry walls, wall board partitions, and suspended ceilings according to the following:

1. Chrome-Plated Piping: Cast-brass, one-piece, with set-screw, and polished chrome-plated finish. Use split-casting escutcheons where required, for existing piping.
2. Uninsulated Piping Wall Escutcheons: Cast-brass or stamped-steel, with set-screw.
3. Uninsulated Piping Floor Plates in Utility Areas: Cast-iron floor plates.
4. Insulated Piping: Cast-brass or stamped-steel, with concealed hinge, spring clips, and chrome-plated finish.
5. Piping in Utility Areas: Cast-brass or stamped-steel, with set-screw or spring clips.

M. Sleeves are not required for core drilled holes.

N. Permanent sleeves are not required for holes formed by PE plastic (removable) sleeves.

O. Install sleeves for pipes passing through concrete and masonry walls, concrete floor and roof slabs, and where indicated.

P. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, concrete floor and roof slabs, and where indicated.

1. Cut sleeves to length for mounting flush with both surfaces.

    a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring where specified.

2. Build sleeves into new walls and slabs as work progresses.
3. Install large enough sleeves to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

    a. PVC Pipe Sleeves: For pipes smaller than 6 inches.
    b. Steel Pipe Sleeves: For pipes smaller than 6 inches.
    c. Steel Sheet-Metal Sleeves: For pipes 6 inches and larger, penetrating gypsum-board partitions.
    d. Cast-Iron Sleeve Fittings: For floors having membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Flashing is specified in Division 16 Section "Basic Electrical Materials and Methods."

        1) Seal space outside of sleeve fittings with nonshrink, nonmetallic grout.

4. Except for below-grade wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using elastomeric joint sealants specified in Division 7 Section "Joint Sealants."

Q. Above Grade, Exterior Wall, Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installation of mechanical seals.

1. Install steel pipe for sleeves smaller than 6 inches.
2. Install cast-iron "wall pipes" for sleeves 6 inches and larger.
3. Assemble and install mechanical seals according to manufacturer's printed instructions.

R. Below Grade, Exterior Wall, Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installation of mechanical seals.

S. Below Grade, Exterior Wall, Pipe Penetrations: Install ductile-iron wall penetration system sleeves according to manufacturer's printed installation instructions.

T. Fire Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestopping sealant material.

U. Verify final equipment locations for roughing-in.

V. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

W. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping system specification Sections.

1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
3. Soldered Joints: Construct joints according to AWS "Soldering Manual," Chapter 22 "The Soldering of Pipe and Tube."
4. Brazed Joints: Construct joints according to AWS "Brazing Manual," Chapter 28 "Pipe and Tube."
5. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full inside diameter. Join pipe fittings and valves as follows:

    a. Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.

    b. Apply appropriate tape or thread compound to external pipe threads (except where dry seal threading is specified).

    c. Align threads at point of assembly.

    d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.

    e. Damaged Threads: Do not use pipe or pipe fittings having threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

6. Welded Joints: Construct joints according to AWS D10.12 "Recommended

Practices and Procedures for Welding Low Carbon Steel Pipe" using qualified processes and welding operators according to "Quality Assurance" Article.

7. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.

8. Plastic Pipe and Fitting Solvent-Cement Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join pipe and fittings according to the following standards:

   a. Comply with ASTM F 402 for safe handling practice of solvent-cement and primers.
   b. Acrylonitrile-Butadiene-Styrene (ABS): ASTM D 2235 and ASTM D 2661.
   c. Chlorinated Poly(Vinyl Chloride) (CPVC): ASTM D 2846 and ASTM F 493.
   d. Poly(Vinyl Chloride) (PVC) Pressure Application: ASTM D 2672.
   e. Poly(Vinyl Chloride) (PVC) Non-Pressure Application: ASTM D 2855.
   f. PVC to ABS (Non-Pressure) Transition: Procedure and solvent cement described in ASTM D 3138.

9. Plastic Pipe and Fitting Heat-Fusion Joints: Prepare pipe and fittings and join with heat-fusion equipment, according to manufacturer's printed instructions.

   a. Plain-End Pipe and Fittings: Butt joining.
   b. Plain-End Pipe and Socket-Type Fittings: Socket-joining.

X. Piping Connections: Except as otherwise indicated make piping connections as specified below.

1. Install unions, in piping 2 inches and smaller, adjacent to each valve and at final connection to each piece of equipment having 2-inches or smaller threaded pipe connection.
2. Install flanges, in piping 2-1/2-inches and larger, adjacent to flanged valves and at final connection to each piece of equipment having flanged pipe connection.
3. Dry Piping Systems (Gas, Compressed Air, and Vacuum): Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems (Water and Steam): Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.2 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to provide the maximum possible headroom, where mounting heights

are not indicated.

B. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to the Engineer.

C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, except where otherwise indicated.

D. Install mechanical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. Connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.

E. Install equipment giving right-of-way to piping systems installed at a required slope.

3.3 LABELING AND IDENTIFYING

A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.

1. Stenciled Markers: Complying with ASME A13.1.
2. Plastic markers, with application systems. Install on pipe insulation segment where required for hot non-insulated pipes.
3. Locate pipe markers as follows wherever piping is exposed in finished spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums) and exterior non-concealed locations.

    a. Near each valve and control device.
    b. Near each branch, excluding short take-offs for fixtures and terminal units. Mark each pipe at branch, where flow pattern is not obvious.
    c. Near locations where pipes pass through walls, floors, ceilings, or enter non-accessible enclosures.
    d. At access doors, manholes, and similar access points that permit view of concealed piping.
    e. Near major equipment items and other points of origination and termination.
    f. Spaced at a maximum of 50 feet intervals along each run. Reduce intervals to 25 feet in congested areas of piping and equipment.
    g. On piping above removable acoustical ceilings, except omit intermediately spaced markers.

B. Equipment: Install engraved plastic laminate sign or equipment marker on or near each major item of mechanical equipment.

1. Lettering Size: Minimum 1/4-inch-high lettering for name of unit where viewing distance is less than 2 feet, 1/2-inch-high for distances up to 6 feet, and proportionately larger lettering for greater distances. Provide secondary lettering

2/3 to 3/4 of size of principal lettering.

2. Text of Signs: Provide text to distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to name of identified unit.

C. Duct Systems: Identify air supply, return, exhaust, intake, and relief ducts with duct markers; or provide stenciled signs and arrows, showing duct system service and direction of flow.

1. Location: In each space where ducts are exposed or concealed by removable ceiling system, locate signs near points where ducts enter into space and at maximum intervals of 50 feet.

D. Adjusting: Relocate identifying devices which become visually blocked by work of this Division or other Divisions.

3.4 PAINTING AND FINISHING

A. Damage and Touch-Up: Repair marred and damaged factory painted finishes with materials and procedures to match original factory finish.

3.5 CONCRETE BASES

A. Construct concrete bases for equipment, but not less than 6 inches larger in both directions than supported unit. Follow supported equipment manufacturer's setting templates for anchor bolt and tie locations. Use 4500 psi, 28-day compressive strength concrete and reinforcement.

3.6 ERECTION OF METAL SUPPORTS AND ANCHORAGE

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.

B. Field Welding: Comply with AWS D1.1 "Structural Welding Code - Steel."

3.7 ERECTION OF WOOD SUPPORTS AND ANCHORAGE

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorage to support and anchor mechanical materials and equipment.

B. Select fastener sizes that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

3.8 DEMOLITION

A. Disconnect, demolish, and remove Work specified under Division 15 and as indicated.

B. Where pipe, ductwork, insulation, or equipment to remain is damaged or disturbed, remove damaged portions and install new products of equal capacity and quality.

C. Accessible Work: Remove indicated exposed pipe and ductwork in its entirety.

D. Abandoned Work: Cut and remove buried pipe abandoned in place, 2 inches beyond the face of adjacent construction. Cap and patch surface to match existing finish.

E. Removal: Remove indicated equipment from the project site.

F. Temporary Disconnection: Remove, store, clean, reinstall, reconnect, and make operational equipment indicated for relocation.

3.9 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of the trades involved.

B. Repair cut surfaces to match adjacent surfaces.

END OF SECTION 15050

SECTION 15100

VALVES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes general duty valves common to most mechanical piping systems.

1. Special purpose valves are specified in individual piping system specifications.

B. Provide valve tags and charts.

1.2 SUBMITTALS

A. Submit the following: Product data, including body material, valve design, pressure and temperature classification, end connection details, seating materials, trim material and arrangement, dimensions and required clearances, and installation instructions.

1.3 QUALITY ASSURANCE

A. Single Source Responsibility: Comply with the requirements specified in Division .

B. American Society of Mechanical Engineers (ASME) Compliance: Comply with ASME B31.9 for building services piping and ASME B31.1 for power piping.

C. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) Compliance: Comply with the various MSS Standard Practices referenced.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Crane
2. Grinnell
3. Hammond
4. Milwaukee
5. Nibco
6. Powell
7. Stockham

2.2 VALVE FEATURES, GENERAL

A. Valve Design: Rising stem or rising outside screw and yoke stems.

1. Nonrising stem valves may be used where headroom prevents full extension of rising stems.

B. Pressure and Temperature Ratings: As scheduled and required to suit system pressures and temperatures.

C. Sizes: Same size as upstream pipe, unless otherwise indicated.

D. Operators: Provide the following special operator features:

1. Handwheels, fastened to valve stem, for valves other than quarter turn.
2. Lever handles, on quarter-turn valves 6-inch and smaller, except for plug valves. Provide plug valves with square heads; provide one wrench for every 10 plug valves.
3. Chain-wheel operators, for valves 2-1/2-inch and larger, install 72 inches or higher above finished floor elevation. Extend chains to an elevation of 5'-0" above finished floor elevation.
4. Gear drive operators, on quarter-turn valves 8-inch and larger.

E. Extended Stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation.

F. Bypass and Drain Connections: Comply with MSS SP-45 bypass and drain connections.

G. End Connections: As indicated in the valve specifications.

1. Threads: Comply with ANSI B1.20.1.
2. Flanges: Comply with ANSI B16.1 for cast iron, ANSI B16.5 for steel, and ANSI B16.24 for bronze valves.
3. Solder-Joint: Comply with ANSI B16.18.

a. Caution: Where soldered end connections are used, use solder having a melting point below 840 deg F for gate, globe, and check valves; below 421 deg F for ball valves.

2.3 GATE VALVES

A. Gate Valves, 2-Inch and Smaller: MSS SP-80; Class 125, body and bonnet of ASTM B 62 cast bronze; with threaded or solder ends, solid disc, copper-silicon alloy stem, brass packing gland, "Teflon" impregnated packing, and malleable iron handwheel. Provide Class 150 valves meeting the above where system pressure requires.

B. Gate Valves, 2-Inch and Smaller: MSS SP-80; Class 150, body and union bonnet of ASTM B 62 cast bronze; with threaded or solder ends, solid disc, copper-silicon alloy stem, brass packing gland, "Teflon" impregnated packing, and malleable iron handwheel. Do not use solder end valves for hot water heating or steam piping applications.

C. Gate Valves, 2-1/2-Inch and Larger: MSS SP-70; Class 125 iron body, bronze mounted, with body and bonnet conforming to ASTM A 126 Class B; with flanged ends, "Teflon" impregnated packing, and two-piece backing gland assembly.

2.4 BALL VALVES

A. Ball Valves, 1 Inch and Smaller: Rated for 150 psi saturated steam pressure, 400 psi WOG pressure; two-piece construction; with bronze body conforming to ASTM B 62, standard (or regular) port, chrome-plated brass ball, replaceable "Teflon" or "TFE" seats and seals, blowout-proof stem, and vinyl-covered steel handle. Provide solder ends for condenser water, chilled water, and domestic hot and cold water service; threaded ends for heating hot water and low-pressure steam.

B. Ball Valves, 1-1/4-Inch to 2-Inch: Rated for 150 psi saturated steam pressure, 400 psi WOG pressure; 3-piece construction; with bronze body conforming to ASTM B 62, conventional port, chrome-plated brass ball, replaceable "Teflon" or "TFE" seats and seals, blowout proof stem, and vinyl-covered steel handle. Provide solder ends for condenser water, chilled water, and domestic hot and cold water service; threaded ends for heating hot water and low-pressure steam.

2.5 PLUG VALVES

A. Plug Valves, 2-Inch and Smaller: Rated at 150 psi WOG; bronze body, with straightaway pattern, square head, and threaded ends.

B. Plug Valves, 2-1/2-Inch and Larger: MSS SP-78; rated at 175 psi WOG; lubricated plug type, with semisteel body, single gland, wrench operated, and flanged ends.

2.6 GLOBE VALVES

A. Globe Valves, 2-Inch and Smaller: MSS SP-80; Class 125; body and screwed bonnet of ASTM B 62 cast bronze; with threaded or solder ends, brass or replaceable composition disc, copper-silicon alloy stem, brass packing gland, "Teflon" impregnated packing, and malleable iron handwheel. Provide Class 150 valves meeting the above where system pressure requires.

B. Globe Valves, 2-1/2-Inch and Larger: MSS SP-85; Class 125 iron body and bolted bonnet conforming to ASTM A 126, Class B; with outside screw and yoke, bronze mounted, flanged ends, and "Teflon" impregnated packing, and two-piece backing gland

assembly.

2.7 BUTTERFLY VALVES

A. Butterfly Valves, 2-1/2-Inch and Larger: MSS SP-67; rated at 200 psi; cast-iron body conforming to ASTM A 126, Class B. Provide valves with field replaceable EPDM sleeve, nickel-plated ductile iron disc (except aluminum bronze disc for valves installed in condenser water piping), stainless steel stem, and EPDM O-ring stem seals. Provide lever operators with locks for sizes 2 through 6 inches and gear operators with position indicator for sizes 8 through 24 inches. Provide lug or wafer type as indicated. Drill and tap valves on dead-end service or requiring additional body strength.

2.8 CHECK VALVES

A. Swing Check Valves, 2-Inch and Smaller: MSS SP-80; Class 125, cast-bronze body and cap conforming to ASTM B 62; with horizontal swing, Y-pattern, and bronze disc; and having threaded or solder ends. Provide valves capable of being reground while the valve remains in the line. Provide Class 150 valves meeting the above specifications, with threaded end connections, where system pressure requires or where Class 125 valves are not available.

B. Swing Check Valves, 2-1/2-Inch and Larger: MSS SP-71; Class 125 (Class 175 FM approved for fire protection piping systems), cast iron body and bolted cap conforming to ASTM A 126, Class B; horizontal swing, and bronze disc or cast-iron disc with bronze disc ring; and flanged ends. Provide valves capable of being refitted while the valve remains in the line.

C. Wafer Check Valves: Class 250, cast-iron body; with replaceable bronze seat, and non-slam design lapped and balanced twin bronze flappers and stainless steel trim and torsion spring. Provide valves designed to open and close at approximately one foot differential pressure.

D. Lift Check Valves, 2-Inch and Smaller: Class 125; cast-bronze body and cap conforming to ASTM B 62; horizontal or angle pattern, lift-type valve, with stainless steel spring, bronze disc holder with renewable "Teflon" disc, and threaded ends. Provide valves capable of being refitted and ground while the valve remains in the line.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior through the end ports for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks used to prevent disc movement during shipping and handling.

B. Actuate valve through an open-close and close-open cycle. Examine functionally

significant features, such as guides and seats made accessible by such actuation. Following examination, return the valve closure member to the shipping position.

C. Examine threads on both the valve and the mating pipe for form (i.e., out-of-round or local indentation) and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Check gasket material for proper size, material composition suitable for service, and freedom from defects and damage.

E. Prior to valve installation, examine the piping for cleanliness, freedom from foreign materials, and proper alignment.

F. Replace defective valves with new valves.

3.2 VALVE ENDS SELECTION

A. Select valves with the following ends or types of pipe/tube connections:

1. Copper Tube Size, 2-Inch and Smaller: Solder ends, except provide threaded ends for heating hot water and low-pressure steam service.
2. Steel Pipe Sizes, 2-Inch and Smaller: threaded or grooved end.
3. Steel Pipe Sizes 2-1/2 Inch and Larger: grooved end or flanged.

3.3 VALVE INSTALLATIONS

A. General Application: Use gate, ball, and butterfly valves for shut-off duty; globe, ball, and butterfly for throttling duty. Refer to piping system specification sections for specific valve applications and arrangements.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves and unions for each fixture and item of equipment arranged to allow equipment removal without system shutdown. Unions are not required on flanged devices.

D. Install three-valve bypass around each pressure reducing valve using throttling-type valves.

E. Install valves in horizontal piping with stem at or above the center of the pipe.

F. Install valves in a position to allow full stem movement.

G. Installation of Check Valves: Install for proper direction of flow as follows:

1. Swing Check Valves: Horizontal position with hinge pin level.
2. Wafer Check Valves: Horizontal or vertical position, between flanges.
3. Lift Check Valve: With stem upright and plumb.

3.4 SOLDER CONNECTIONS

A. Cut tube square and to exact lengths.

B. Clean end of tube to depth of valve socket with steel wool, sand cloth, or a steel wire brush to a bright finish. Clean valve socket in same manner.

C. Apply proper soldering flux in an even coat to inside of valve socket and outside of tube.

D. Open gate and globe valves to full open position.

E. Remove the cap and disc holder of swing check valves having composition discs.

F. Insert tube into valve socket, making sure the end rests against the shoulder inside valve. Rotate tube or valve slightly to ensure even distribution of the flux.

G. Apply heat evenly to outside of valve around joint until solder will melt upon contact. Feed solder until it completely fills the joint around tube. Avoid hot spots or overheating valve. Once the solder starts cooling, remove excess amounts around the joint with a cloth or brush.

3.5 THREADED CONNECTIONS

A. Note the internal length of threads in valve ends, and proximity of valve internal seat or wall, to determine how far pipe should be threaded into valve.

B. Align threads at point of assembly.

C. Apply appropriate tape or thread compound to the external pipe threads (except where dry seal threading is specified).

D. Assemble joint, wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.

3.6 FLANGED CONNECTIONS

A. Align flange surfaces parallel.

B. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly with a torque wrench.

C. For dead-end service, butterfly valves require flanges both upstream and downstream for proper shutoff and retention.

3.7 FIELD QUALITY CONTROL

A. Tests: After piping systems have been tested and put into service, but before final adjusting and balancing, inspect valves for leaks. Adjust or replace packing to stop leaks; replace valves if leak persists.

3.8 ADJUSTING AND CLEANING

A. Cleaning: Clean mill scale, grease, and protective coatings from exterior of valves and prepare valves to receive finish painting or insulation.

3.9 VALVE PRESSURE/TEMPERATURE CLASSIFICATION SCHEDULES

VALVES, 2-INCH AND SMALLER

SERVICE	GATE	GLOBE	BALL	CHECK
Condenser Water	125	125	150	125
Chilled Water	125	125	150	125
Domestic Hot and Cold Water 125	125	150	125	125
Heating Hot Water	150	150	150	150
Low-Pressure Steam	150	150	150	150

VALVES, 2-1/2-INCH AND LARGER

SERVICE	GATE	GLOBE	BUTTERFLY	CHECK
Condenser Water	125	125	200	125
Chilled Water	125	125	200	125
Domestic Hot and Cold Water 125	125	200	125	125
Heating Hot Water	125	125	200	125
Low-Pressure Steam	125	125	200	125

END OF SECTION - 15100

SECTION 15411

WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes potable cold water, hot water, and circulation hot water piping, fittings, and specialties within the building to a point 5 feet outside the building.

1.2 DEFINITIONS

A. Water Distribution Pipe: A pipe within the building or on the premises that conveys water from the water service pipe or meter to the points of usage.

B. Water Service Pipe: The pipe from the water main or other source of potable water supply to the water distributing system of the building served.

C. Pipe sizes used in this Specification are nominal pipe size (NPS).

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specifications Sections.

1. Product data for each piping specialty and valve specified.
2. Welder Certificates signed by Contractor certifying that welders comply with requirements specified in "Quality Assurance" Article.
3. Certification of Compliance with ASME and UL fabrication requirements specified below.
4. Test reports specified in Part 3 of this Section.
5. Maintenance data for each piping specialty and valve specified for inclusion in Maintenance Manual specified in Division 1 and Division 15 Section - "Basic Mechanical Requirements."

1.4 QUALITY ASSURANCE

A. Qualify welding processes and welding operators in accordance with ASME Boiler and Pressure Vessel Code, Section IX, "Welding and Brazing Qualifications."

B. Regulatory Requirements: Comply with the provisions of the following codes:

1. ASME B31.9 "Building Services Piping" for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label.
2. ASME Boiler and Pressure Vessel Code, Section IX, "Welding and Brazing Qualifications" for Qualifications for Welding Processes and Operators.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store pipe in a manner to prevent sagging and bending.

1.6 SEQUENCING AND SCHEDULING

A. Coordinate the size and location of concrete equipment pads. Cast anchor-bolt inserts into pad. Concrete, reinforcement, and formwork requirements are specified in Division 3.

B. Coordinate the installation of pipe sleeves for foundation wall penetrations.

1.7 EXTRA MATERIALS

A. Maintenance Stock: Furnish one valve key for each key-operated wall hydrant, hose bibb, fixture supply, or faucet installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include but are not limited to the following:

1. Basket Strainers:
   a. Josam Co.
   b. Metraflex Co.
   c. Smith (Jay R.) Mfg. Co.
   d. Spirax Sarco, Inc.
   e. Victaulic Co. of America

2. Balance Cocks:

   a. Hammond Valve Corp.
   b. Milwaukee Valve Co., Inc.
   c. Nibco, Inc.
   d. Stockham Valves & Fittings, Inc.

3. Hose Bibbs:

    a. Lee Brass Co.
    b. Mansfield Plumbing Products
    c. Nibco, Inc.
    d. Watts Regulator Co.
    e. Woodford Mfg. Co.

4. Wall Hydrants:

    a. Josam Co.
    b. Smith (Jay R.) Mfg. Co.
    c. Wade Div., Tyler Pipe
    d. Woodford Mfg. Co.
    e. Zurn Industries Inc., Hydromechanics Div.

5. Backflow Preventers:

    a. Cla-Val Co.
    b. Conbraco Industries, Inc.
    c. Febco
    d. Hersey Products, Inc.
    e. Watts Regulator Co.
    f. Zurn Industries Inc. Wilkins Regulator Div.

6. Pressure-Regulating Valves:

    a. Cash (A. W.) Valve Mfg. Corp.
    b. Cla-Val Co.
    c. Spence Engineering Co., Inc.
    d. Watts Regulator Co.
    e. Zurn Industries Inc., Wilkins Regulator Div.

7. Water Meters:

    a. Badger Meter, Inc.
    b. Hays Div., Romac Industries
    c. Hersey Products, Inc.
    d. Neptune Water Meter Co.; Subs. Neptune Intl. Corp.
    e. Rockwell Intl.; Measurement & Flow Control Div.

8. Relief Valves:

    a. Cash (A. W.) Valve Mfg. Corp.
    b. Conbraco Industries, Inc.
    c. Watts Regulator Co.

d. Zurn Industries, Inc. Wilkins Regulator Div.

9. Water Hammer Arresters:

a. Amtrol, Inc.
b. Ancon, Inc.
c. Josam Co.
d. Precision Plumbing Products, Inc.
e. Smith (Jay R.) Mfg. Co.
f. Wade Div., Tyler Pipe
g. Watts Regulator Co.
h. Zurn Industries, Inc.; Hydromechanics Div.

10. Mechanical Couplings and Fittings For Grooved-End Steel Pipe:

a. Grinnell Corp.
b. Gustin-Bacon Div., Tyler Pipe
c. Stockham Valves & Fittings, Inc.
d. Victaulic Co. of America

11. Mechanical Couplings and Fittings For Grooved-End Copper Tube:

a. Victaulic Co. of America

12. Compression Fittings For PB Plastic Pipe:

a. Brass-Craft Sub. of Masco Corp.

13. Vacuum Breakers For Hose Connections:
a. Cash (A.W.) Valve Mfg. Corp.
b. Conbraco Industries, Inc.
c. Watts Regulator Co.

2.2 PIPE AND TUBE MATERIALS, GENERAL

A. Copper Tube: ASTM B 88, Type L Water Tube, drawn temper.

B. Copper Tube: ASTM B 88, Type K Water Tube, annealed temper.

2.3 FITTINGS

A. Wrought Copper Solder-Joint Fittings: ANSI B16.22, streamlined pattern.

B. Wrought Copper and Bronze Grooved-End Fittings: ASTM B 75 Tube and ASTM B 584 Bronze Castings.

C. Dielectric Unions: Threaded, solder, or grooved-end connections as required to suit application; constructed to isolate dissimilar metals, prevent galvanic action, and prevent corrosion.

D. Flexible Connectors: Stainless-steel bellows with woven, flexible, bronze wire reinforced protective jacket; minimum 150 psig working pressure, maximum 250 deg F operating temperature. Connectors shall have flanged or threaded-end connections to match equipment connected and shall be capable of 3/4-inch misalignment.

2.4 JOINING MATERIALS

A. Solder Filler Metal: ASTM B 32, 95-5 Tin-Antimony.

B. Brazing Filler Metals: AWS A5.8, BCuP Series.

C. Gasket Material: Thickness, material, and type suitable for fluid to be handled and design temperatures and pressures.

2.5 GENERAL-DUTY VALVES

A. General-duty valves (i.e., gate, globe, check, ball, and butterfly valves) are specified in Division 15 Section "Valves." Special duty valves are specified below by their generic name; refer to Part 3 Article "Valve Application" for specific uses and applications for each valve specified.

2.6 SPECIAL DUTY VALVES

A. Balance Cocks: 400 PSI WOG, 2 piece, ball valve, handle, memory stop, with threaded-end connections conforming to ASME B1.20.1.

B. Balance Cocks: 400 psi WOG, 2 piece bronze, ball valve, handle, memory stop, with solder-end connections.

2.7 PIPING SPECIALTIES

A. Water Hammer Arresters: Bellows type, with stainless steel casing and bellows, pressure rated for 250 psi, tested and certified in accordance with PDI Standard WH-201.

B. Basket Strainers: Cast-iron body, 125 psi flanges, bolted-type or yoke-type cover with removable noncorrosive perforated strainer basket having 1/8-inch perforations and lift-out handle.

C. Hose Connections: Hose connections shall have garden hose thread outlets conforming to ASME B1.20.7.

D. Hose Bibbs: Bronze body, renewable composition disc, tee handle, 1/2- or 3/4-inch solder inlet, hose outlet.

E. Hose Bibbs: Bronze body with chrome- or nickel-plated finish, with renewable composition disc, wheel handle, 1/2- or 3/4-inch solder inlet, hose outlet.

F. Hose Bibbs: Bronze body with chrome- or nickel-plated finish, with renewable composition disc, wheel handle, 1/2- or 3/4-inch solder inlet, hose outlet.

G. Recessed Nonfreeze Wall Hydrants: Cast-bronze box, with chrome- plated face, tee handle key, vacuum breaker, hinged locking cover, 3/4-inch inlet, and hose outlet. Bronze casing shall be length to suit wall thickness.

H. Projecting Nonfreeze Wall Hydrants: Cast-bronze, with chrome-plated face, tee handle key, vacuum breaker, 3/4-inch inlet, and hose outlet. Bronze casing shall be length to suit wall thickness.

I. Floor Level Nonfreeze Hydrants: Cast-bronze hydrant, with rough bronze box, tee-handle key, drain hole, vacuum breaker, hinged locking cover, 3/4-inch inlet, and hose outlet. Bronze casing shall be length to suit depth of bury.

J. Nonfreeze Post Hydrants: Cast-bronze hydrant, with tee-handle key, drain hole, vacuum breaker, 3/4-inch inlet, and hose outlet. Bronze casing with cast-iron casing guard shall be length to suit depth of bury.

K. Vacuum Breakers: Hose connection vacuum breakers shall conform to ASSE Standard 1011, with finish to match hose connection.

L. Backflow Preventers: Reduced-pressure-principle assembly consisting of shutoff valves on inlet and outlet and strainer on inlet. Assemblies shall include test cocks and pressure-differential relief valve located between 2 positive seating check valves and comply with requirements of ASSE Standard 1013.

M. Pressure-Regulating Valves: Single-seated, direct-operated type, having bronze body with integral strainer and complying with requirements of ASSE Standard 1003. Select proper size for maximum flow rate and inlet and outlet pressures required.

N. Relief Valves: Sizes for relief valves shall be in accordance with ASME Boiler and Pressure Vessel Codes for required capacity of the appliance for which installed.

1. Combined Pressure-Temperature Relief Valves: Bronze body, test lever, thermostat, complying with ANSI Z21.22 listing requirements for temperature discharge capacity. Temperature relief valves shall be factory set at 210 deg F, and pressure relief at 150 psi.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine rough-in requirements for plumbing fixtures and other equipment with water connections to verify actual locations of piping connections prior to installation.

3.2 PIPE APPLICATIONS

A. Install Type L, drawn copper tube with wrought copper fittings and solder joints for pipe sizes 4 inches and smaller, above ground, within building. Install Type K, annealed temper copper tube for pipe sizes 2 inches and smaller, with minimum number of joints, below ground.

B. Water piping in sizes 2-1/2 to 6 inches may be Type L drawn copper tube with roll-grooved ends and mechanical couplings, above ground, within building.

3.3 PIPING INSTALLATION

A. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of the piping systems. Location and arrangement of piping layout take into consideration pipe sizing and friction loss, expansion, pump sizing, and other design considerations. So far as practical, install piping as required.

B. Use fittings for all changes in direction and branch connections.

C. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted unless expressly required.

D. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.

E. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors.

F. Install piping tight to slabs, beams, joists, columns, walls, and other permanent elements of the building. Provide space to permit insulation applications, with 1-inch clearance outside the insulation. Allow sufficient space above removable ceiling panels to allow for panel removal.

G. Locate groups of pipes parallel to each other, spaced to permit applying full insulation and servicing of valves.

H. Install drains at low points in mains, risers, and branch lines consisting of a tee fitting, 3/4-inch ball valve, and short 3/4-inch threaded nipple and cap.

I. Exterior Wall Penetrations: Seal pipe penetrations through exterior walls with sleeves and mechanical sleeve seals. Pipe sleeves smaller than 6 inches shall be galvanized steel pipe; pipe sleeves 6 inches and larger shall be galvanized steel sheet metal.

J. Fire Barrier Penetrations: Where pipes pass though fire-rated walls, partitions, ceilings, and floors, maintain the fire-rated integrity. Refer to Division 7 for special sealers and materials.

3.4 HANGERS AND SUPPORTS

A. General: Hanger, support, and anchor devices conforming to MSS SP-69 are specified in Division 15 Section "Supports and Anchors

B. Pipe Attachments: Install the following:

1. Adjustable steel clevis hangers, MSS Type 1, for individual horizontal runs less than 20 feet in length.
2. Adjustable roller hangers, MSS Type 43, and spring hangers, MSS Type 41 with Type 49, for individual horizontal runs 20 feet and longer.
3. Pipe roll, complete MSS Type 44 for multiple horizontal runs, 20 feet or longer, support on a trapeze.
4. Spring hangers to support vertical runs.

C. Install hangers for horizontal piping with the following maximum spacing and minimum rod sizes as required by current International Plumbing Codes and requirements of Governing Authorities:

3.5 PIPE AND TUBE JOINT CONSTRUCTION

A. Soldered Joints: Comply with the procedures contained in the AWS "Soldering Manual."

B. Brazed Joints: Comply with the procedures contained in the AWS "Brazing Manual."

1. CAUTION: Remove stems, seats, and packing of valves and accessible internal parts of piping specialties before soldering and brazing.
2. Fill the tubing and fittings during soldering and brazing with an inert gas (nitrogen or carbon dioxide) to prevent formation of scale.
3. Heat joints to proper and uniform temperature.

C. Threaded Joints: Conform to ASME B1.20.1, tapered pipe threads for field-cut threads. Join pipe fittings and valves as follows:

1. Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
2. Align threads at point of assembly.
3. Apply appropriate tape or thread compound to the external pipe threads (except where dry seal threading is specified).
4. Assemble joint wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.

    a. Damaged Threads: Do not use pipe with corroded or damaged threads. If a weld opens during cutting or threading operations, that portion of pipe shall not be used.

D. Flanged Joints: Align flange surfaces parallel. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly with a torque wrench.

E. Grooved-End Joints: Prepare pipe and tubing and install in accordance with manufacturer's installation instructions.

3.6 ROUGH-IN FOR WATER METER

A. Install rough-in piping and specialties for water meter installation in accordance with utility company's instructions and requirements.

3.7 VALVE APPLICATIONS

A. General-Duty Valve Applications: The Drawings indicate valve types to be used. Provide specific valve types as required:

1. Shut-off duty: Use gate, ball, and butterfly valves.
2. Throttling duty: Use globe, ball, and butterfly valves.

3.8 INSTALLATION OF VALVES

A. Sectional Valves: Install sectional valves on each branch and riser, close to main, where branch or riser serves 2 or more plumbing fixtures or equipment connections. For sectional valves 2 inches and smaller, use gate or ball valves; for sectional valves 2-1/2 inches and larger, use gate or butterfly valves.

B. Shutoff Valves: Install shutoff valves on inlet of each plumbing equipment item, on each supply to each plumbing fixture. For shutoff valves 2 inches and smaller, use gate or ball valves; for shutoff valves 2-1/2 inches and larger, use gate or butterfly valves.

C. Drain Valves: Install drain valves on each plumbing equipment item, located to drain equipment completely for service or repair. Install drain valves at the base of each

riser, at low points of horizontal runs, and elsewhere as required to drain distribution piping system completely. For drain valves 2 inches and smaller, use gate or ball valves; for drain valves 2-1/2 inches and larger, use gate or butterfly valves.

D. Check Valves: Install swing check valves on discharge side of each pump and elsewhere as required.

E. Balance Cocks: Install in each hot water recirculating loop, discharge side of each pump, and elsewhere as required.

F. Hose Bibbs: Install on exposed piping where required with vacuum breaker.

G. Wall Hydrants: Install where required with vacuum breaker.

3.9 INSTALLATION OF PIPING SPECIALTIES

A. Install backflow preventers at each connection to mechanical equipment and systems and in compliance with the plumbing code and authority having jurisdiction. Locate in same room as equipment being connected. Install air cap fitting and pipe relief outlet drain without valves to nearest floor drain.

B. Install pressure-regulating valves with inlet and outlet shutoff valves and balance cock bypass. Install pressure gage on valve outlet.

3.10 EQUIPMENT CONNECTIONS

A. Piping Runouts to Fixtures: Provide hot and cold water piping runouts to fixtures of sizes required, but in no case smaller than required by plumbing code.

B. Mechanical Equipment Connections: Connect hot and cold water piping system to mechanical equipment as required. Provide shutoff valve and union for each connection; provide drain valve on drain connection. For connections 2-1/2 inches and larger, use flanges instead of unions.

3.11 FIELD QUALITY CONTROL

A. Inspections: Inspect water distribution piping as follows:

1. Do not enclose, cover, or put into operation water distribution piping system until it has been inspected and approved by the authority having jurisdiction.
2. During the progress of the installation, notify the plumbing official having jurisdiction at least 24 hours prior to the time such inspection must be made. Perform tests specified below in the presence of the plumbing official.

a. Rough-in Inspection: Arrange for inspection of the piping system before concealed or closed in after system is roughed in and prior to setting fixtures.
b. Final Inspection: Arrange for a final inspection by the plumbing official to observe the tests specified below and to ensure compliance with the requirements of the plumbing code.

3. Reinspections: Whenever the plumbing official finds that the piping system will not pass the test or inspection, make the required corrections and arrange for reinspection by the plumbing official.
4. Reports: Prepare inspection reports signed by the plumbing official.

B. Test water distribution piping as follows:

1. Test for leaks and defects all new water distribution piping systems and parts of existing systems that have been altered, extended or repaired. If testing is performed in segments, submit a separate report for each test, complete with a diagram of the portion of the system tested.
2. Leave uncovered and unconcealed all new, altered, extended, or replaced water distribution piping until it has been tested and approved. Expose all such work for testing that has been covered or concealed before it has been tested and approved.
3. Cap and subject the piping system to a static water pressure of 50 psig above the operating pressure without exceeding the pressure rating of the piping system materials. Isolate the test source and allow to stand for 4 hours. Leaks and loss in test pressure constitute defects that must be repaired.
4. Repair all leaks and defects with new materials and retest system or portion thereof until satisfactory results are obtained.
5. Prepare reports for all tests and required corrective action.

3.12 ADJUSTING AND CLEANING

A. Clean and disinfect water distribution piping as follows:

1. Purge all new water distribution piping systems and parts of existing systems that have been altered, extended, or repaired prior to use.
2. Use the purging and disinfecting procedure proscribed by the authority having jurisdiction or, in case a method is not prescribed by that authority, the procedure described in either AWWA C651, or AWWA C652, or as described below:

a. Flush the piping system with clean, potable water until dirty water does not appear at the points of outlet.
b. Fill the system or part thereof with a water/chlorine solution containing at least 50 parts per million of chlorine. Isolate (valve off) the system or part thereof and allow to stand for 24 hours.

c. Drain the system or part thereof of the previous solution and refill with a water/chlorine solution containing at least 200 parts per million of chlorine and isolate and allow to stand for 3 hours.
d. Following the allowed standing time, flush the system with clean, potable water until chlorine does not remain in the water coming from the system.
e. Submit water samples in sterile bottles to the authority having jurisdiction. Repeat the procedure if the biological examination made by the authority shows evidence of contamination.

B. Prepare reports for all purging and disinfecting activities.

3.13 COMMISSIONING

A. Fill the system. Check compression tanks to determine that they are not air bound and that the system is completely full of water.

B. Before operating the system, perform these steps:

1. Close drain valve, hydrants, and hose bibbs.
2. Open valves to full open position.
3. Remove and clean strainers.
4. Check pumps for proper direction of rotation. Correct improper wiring.
5. Lubricate pump motors and bearings.

END OF SECTION 15411

SECTION 15440

PLUMBING FIXTURES

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes plumbing fixtures and trim, fittings, and accessories, appurtenances, and supports associated with plumbing fixtures.

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

1. Division 15 Section "Drainage and Vent Systems".
2. Division 15 Section "Valves" for valves used as supply stops.
3. Division 15 Section "Water Distribution Piping".

1.2 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for each type of plumbing fixture as scheduled on drawings, including fixture and trim, fittings, faucets, accessories, supports, construction details, dimensions of components, flow rates of fixtures, and finishes.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with requirements of ANSI Standard A117.1, "Buildings and Facilities -- Providing Accessibility and Useability for Physically Handicapped People," and Public Law 90-480, "Architectural Barriers Act, 1968," with respect to plumbing fixtures for the physically handicapped.

B. Design Concept: The drawings indicate types of plumbing fixtures and are based on the specific descriptions, manufacturers, models, and numbers indicated. Plumbing fixtures having equal performance characteristics by other manufacturers may be considered provided that deviations in dimensions, operation, color or finish, or other characteristics are minor and do not change the design concept or intended performance as judged by the Engineer. Burden of proof for equality of plumbing fixtures is on the proposer.

C. Codes and Standards: As specified in Section 15010.

D. ANSI Standard A112: All specifications for plumbing fixtures.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver plumbing fixtures in manufacturer's protective packing, crating, and covering.

B. Store plumbing fixtures on elevated platforms in a dry location.

1.5 EXTRA MATERIALS

A. Deliver extra materials to Owner. Furnish extra materials described below matching products installed, packaged with protective covering for storage, and identified with labels clearly describing contents.

1. Faucet Washers and O-rings: Furnish quantity of identical units not less than 10 percent of amount of each installed.
2. Faucet Cartridges and O-rings: Furnish quantity of identical units not less than 5 percent of amount of each installed.
3. Water Closet Tank Repair Kits: Furnish quantity of identical flush valve units not less than 5 percent of amount of each type installed.
4. Toilet Seats: Furnish quantity of identical units not less than 5 percent of amount of each type toilet seat installed.

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES, GENERAL

A. Fixtures shall be in accordance with specifications and scheduled on the drawings.

B. Maximum flow rate for lavatories shall be 2.5 gpm. Water closets shall use a maximum of 1.6 gallons per flush and sinks and shower heads shall use a maximum of 2.5 gpm.

C. Provide air chambers at all fixtures.

2.2 FAUCETS

A. Faucets General: Unless otherwise specified, provide faucets that are cast brass with polished chrome-plated finish.

2.3 FITTINGS, EXCEPT FAUCETS

A. Fittings General: Unless otherwise specified, provide fittings fabricated of brass, with a polished chrome plated finish.

B. Lavatory Supplies and Stops: Handle angle stop, having 1/2-inch NPS inlet with wall flange and 3/8-inch by 12-inch flexible tubing riser outlet.

C. Lavatory Traps: Cast brass, 1-1/4 inch NPS adjustable P-trap with cleanout, 17 gage tubular waste to wall, and wall flange.

D. Sink Supplies and Stops: Handle angle stop, having 1/2-inch NPS inlet with wall flange and 1/2-inch by 12-inch flexible tubing riser outlet.

E. Sink Traps: Cast brass, 1-1/2 inch NPS adjustable P-trap with cleanout, 17 gage tubular waste to wall, and wall flange.

F. Sink Continuous Wastes: Polished chrome-plated, tubular brass, 1-1/2 inches, 17 gauge, with brass nuts on slip inlets, and of configurations indicated.

G. Water Closet Supplies and Stops: Handle angle stop, having 1/2-inch NPS inlet with wall flange and 1/2-inch by 12-inch flexible tubing riser outlet with collar.

H. Bathtub Waste and Overflow Fittings: Concealed 1-1/2-inch, 17-gage, polished chrome-plated, tubular brass; lever-operated grid strainer bath waste and overflow, spud with universal-type outlet connection suitable for 1-1/2-inch tubing, or 1-1/2-inch solder-joint outlet connection on waste tee.

I. Bathtub traps: Cast brass, 1-1/2 inch NPS adjustable P-trap with cleanout, 17 gage tubular waste to wall, and wall flange.

J. Escutcheons: Polished chrome-plated, sheet steel wall flange with friction clips.

K. Deep Pattern Escutcheons: Wall flange with set screw or sheet steel wall flange with friction clips, of depth adequate to conceal protruding roughing-in fittings.

L. Provide fittings specified as part of a fixture description, in lieu of fitting requirements above.

2.4 PLUMBING FIXTURE SUPPORTS

A. Supports: ASME A112.6.1M, categories and types as required for wall-hanging fixtures specified, and wall reinforcement.

B. Support categories are:

1. Chair Carriers, Heavy Duty: Supports with rectangular steel uprights for wall-hanging fixtures.
2. Reinforcement: 2-inch by 4-inch wood blocking between studs or 1/4-inch by 6-inch steel plates attached to studs, in wall construction, to secure floor-mounted and special fixtures to wall.

C. Support Types: Provide support of category specified, of type having features required to match fixture.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for potable cold water and hot water supplies and soil, waste, and vent piping systems to verify actual locations of piping connections prior to installing fixtures.

B. Examine walls, floors, and cabinets for suitable conditions where fixtures are to be installed.

C. Do not proceed until unsatisfactory conditions have been corrected.

3.2 APPLICATION

A. Install plumbing fixtures and specified components, in accordance with designations and locations indicated on Drawings.

B. Install supports for plumbing fixtures in accordance with categories indicated, and of type required:

3.3 INSTALLATION OF PLUMBING FIXTURES

A. Install plumbing fixtures level and plumb, in accordance with fixture manufacturers' written installation instructions, roughing-in drawings, and referenced standards.
B. Install floor-mounted, floor-outlet water closets with closet flanges and gasket seals.

C. Fasten wall hanging plumbing fixtures securely to supports attached to building substrate.

D. Secure supplies behind wall or within wall pipe space, providing rigid installation.

E. Install stop valve in an accessible location in each water supply to each fixture.

F. Install trap on fixture outlet except for fixtures having integral trap.

G. Install escutcheons at each wall, floor, and ceiling penetration in exposed finished locations and within cabinets and millwork. Use deep pattern escutcheons where required to conceal protruding pipe fittings.

H. Seal fixtures to walls, floors, and counters using a sanitary-type, one-part, mildew-resistant, silicone sealant.

3.4 CONNECTIONS

A. Piping installation requirements are specified in other sections of Division 15. The Drawings indicate general arrangement of piping, fittings, and specialties. The following are specific connection requirements:

1. Install piping connections between plumbing fixtures and piping systems and plumbing equipment specified in other sections of Division 15.

3.5 FIELD QUALITY CONTROL

A. Inspect each installed fixture for damage. Replace damaged fixtures and components.

B. Test fixtures to demonstrate proper operation upon completion of installation and after units are water pressurized. Replace malfunctioning fixtures and components, then retest. Repeat procedure until all units operate properly.

3.6 ADJUSTING AND CLEANING

A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.

B. Adjust water pressure at drinking fountains, electric water coolers, and faucets, shower valves, and flushometers having controls, to provide proper flow and stream.

C. Replace washers of leaking and dripping faucets and stops.

D. Clean fixtures, fittings, and spout and drain strainers with manufacturers' recommended cleaning methods and materials.

E. Review the data in Operating and Maintenance Manuals.

3.7 PROTECTION

A. Provide protective covering for installed fixtures and fittings.

B. Do not allow use of fixtures for temporary facilities, except when approved in writing by the Owner.

3.8 FIXTURE SCHEDULE

A. Provide plumbing fixtures as scheduled on the drawings.

END OF SECTION 15440

SECTION 15891

METAL DUCTWORK

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes rectangular and round ducts.

1.3 QUALITY ASSURANCE

A. NFPA Compliance: Comply with the following NFPA Standards:

1. NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems," except as indicated otherwise.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data for each type of ductwork provided, including dimensions and materials of construction.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

A. Galvanized Sheet Steel: Lock forming quality, ASTM A 527, Coating Designation G 90. Provide mill phosphatized finish for exposed surfaces of ducts exposed to view.

2.2 FIRE STOPPING

A. Refer to Division 7 Section "Firestopping" for fire stopping.

2.3 HANGERS AND SUPPORTS

A. Building Attachments: Concrete inserts, powder actuated fasteners, or structural steel fasteners appropriate for building materials. Do not use powder actuated concrete fasteners for lightweight aggregate concretes or for slabs less than 4 inches thick.

B. Hangers: Galvanized sheet steel, or round, uncoated steel, threaded rod.

1. Straps and Rod Sizes: Conform with Table 4 1 in SMACNA HVAC Duct Construction Standards, 1985 Edition, for sheet steel width and gage and steel rod diameters.

C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

2.4 RECTANGULAR DUCT FABRICATION

A. General: Except as otherwise indicated, fabricate rectangular ducts with galvanized sheet steel, in accordance with SMACNA "HVAC Duct Construction Standards," Tables 1 3 through 1 19, including their associated details. Conform to the requirements in the referenced standard for metal thickness, reinforcing types and intervals, tie rod applications, and joint types and intervals.

1. Provide materials that are free from visual imperfections such as pitting, seam marks, roller marks, stains, and discolorations.

2.5 RECTANGULAR DUCT FITTINGS

A. Fabricate elbows, transitions, offsets, branch connections, and other duct construction in accordance with SMACNA "HVAC Metal Duct Construction Standard," 1985 Edition, Figures 2 1 through 2 10.

2.6 ROUND DUCT FABRICATION

A. General: "Basic Round Diameter" as used in this article is the diameter of the size of round duct that has a circumference equal to the perimeter of a given sized of flat oval duct.

B. Round Ducts: Fabricate round supply ducts with spiral lockseam construction to elbows being pleated. Comply with SMACNA "HVAC Duct Construction Standards," Table 3 2 for galvanized steel gages.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION, GENERAL

A. Install ducts with the fewest possible joints.

B. Use fabricated fittings for all changes in directions, changes in size and shape, and connections.

C. Install couplings tight to duct wall surface with projections into duct at connections kept to a minimum.

D. Locate ducts, except as otherwise indicated, vertically and horizontally, parallel and perpendicular to building lines; avoid diagonal runs. Install duct systems in shortest route that does not obstruct useable space or block access for servicing building and its equipment.

E. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

F. Conceal ducts from view in finished and occupied spaces by locating in mechanical shafts, hollow wall construction, or in soffits.

3.2 HANGING AND SUPPORTING

A. Install rigid round, and rectangular metal duct with support systems indicated in SMACNA "HVAC Duct Construction Standards," Tables 4 1 through 4 3 and Figures 4 1 through 4 8.

B. Support horizontal ducts within 2 feet of each elbow.

C. Support vertical ducts at each floor.

D. Upper attachments to structures shall have an allowable load not exceeding 1/4 of the failure (proof test) load but are not limited to the specific methods indicated.

E. Install powder actuated concrete fasteners after concrete is placed and completely cured.

3.3 CONNECTIONS

A. Equipment Connections: Connect equipment with flexible connectors in accordance with Division 15 Section "Duct Accessories."

B. Clean ducts systems prior to final acceptance to remove dust and debris.

END OF SECTION 15891

SECTION 15920

DUCTWORK CLEANING

PART 1 – GENERAL

1.1 Qualification of the HVAC System Cleaning Contractor:

A. Membership: The HVAC system cleaning contractor shall be a certified member of the National Air Duct Cleaners Association (NADCA) for a minimum of 3 years.

B. Certification: The HVAC system cleaning contractor shall have a minimum of one (1) Air System Cleaning Specialist (ASCS) certified by NADCA on a full time basis and in charge of this project.

C. Supervisor Qualifications: A person certified as an ASCS by NADCA shall be responsible for the total work herein specified.

D. Experience: The HVAC system cleaning contractor shall submit records of experience in the field of HVAC system cleaning as requested by the owner. Bids shall be considered from firms, which are regularly engaged in HVAC system maintenance with an emphasis on HVAC system cleaning and decontamination. A list of 5 or more similar projects performed by the duct cleaning contractor in the past 12 months must be included with this bid.

E. Equipment, Materials and Labor: The HVAC system cleaning contractor shall posses and furnish all necessary equipment, materials and labor to adequately perform the specified services.

1. The contractor shall assure that its employees have received safety equipment training, medical surveillance programs, individual health protection measures, and manufacturers product and material safety data sheets (MSDS) as required for the work by the U.S. Occupational Safety and Health Administration, and as described by this specification.
2. The Contractor shall maintain a copy of all current MSDS documentation and safety certifications at the site at all times, as well as comply with all other site documentation requirements of applicable OSHA programs and this specifications.
3. Contractor shall submit to the owner all Material Safety Data Sheets (MSDS) for all chemical products proposed to be used in the cleaning process.

F. Licensing: The HVAC system cleaning contractor shall provide proof of maintaining the proper license(s), if any, as required to do work in this state. Contractor shall comply with all Federal, State and local rules, regulations, and licensing requirements.

1.2 Standards

A. NADCA Standards: The HVAC system cleaning contractor shall perform the services specified her in accordance with the current published standards of the National Air Duct Cleaners Association (NADCA) as modified by the owner in this specification.
   1. All terms in this specification shall have their meaning defined as stated in the NADCA Standards.
   2. Project drawings and specifications.
   3. Approved construction revisions pertaining to the HVAC system.

PART 2 – PRODUCTS

2.1 Scope of Work

A. Scope: The entire Museum and Wonder Workshop ductwork systems as necessary to render HVAC components clean, and to verify the cleanliness through inspection and/or testing in accordance with items specified herein and applicable NADCA Standards.

   The Contractor shall be responsible for the removal of visible surface contaminants and deposits from within the HVAC systems in strict accordance with these specifications.

   The HVAC system includes any interior surface of the facility's air distribution system. All air inlets and outlets, fans, fan housing, fan blades, turning vanes, filters, filter housings, are all considered part of the HVAC system. The HVAC system also includes other components such as dedicated exhaust and ventilation components and make-up air systems.

   The contractor must visit the site and bid accordingly.

2.2 HVAC System Inspections and Site Preparations

A. HVAC System Evaluation: Prior to the commencement of any cleaning work, the HVAC system cleaning contractor shall perform a visual inspection of the HVAC system to determine appropriate methods, tools, and equipment required to satisfactorily complete this project.

   1. Damaged system components found during the inspection shall be documented and brought to the attention of the owner.

B. Site Evaluation and Preparations: Contractor shall conduct a site evaluation, and establish a specific, coordinated plan which details how each area of the building will be protected during the project.

2.3 General HVAC System Cleaning Requirements:

A. Containment: Debris removed during cleaning shall be collected and precautions must be taken to ensure that Debris is not otherwise dispersed outside the HVAC system during the cleaning process.

B. Particulate Collection: Where the Particulate Collection Equipment is exhausting inside the building, HEPA filtration with 99.97% collection efficiency for 0.3-micron size (or greater) particles shall be used. When the Particulate Collection Equipment is exhausting outside the building, Mechanical Cleaning operations shall be undertaken only with Particulate Collection Equipment in place, including adequate filtration to contain Debris removed from the HVAC system. When the Particulate Collection Equipment is exhausting outside the building, precautions shall be taken to locate the equipment down wind and away from tall air intakes and other points of entry into the building.

C. Controlling Odors: All reasonable measures shall be taken to control offensive odors and/or mist vapors during the cleaning process.

D. Component Cleaning: Cleaning methods shall be employed such that all HVAC system components must be Visibly Clean as defined in applicable standards (see NADCA Standards). Upon completion, all components must be returned to those settings recorded just prior to cleaning operations.

E. Air-Volume Control Devices: Dampers and any air-directional mechanical devices inside the HVAC system must have their position marked prior to cleaning and, upon completion, must restored to their marked position.

F. Service Openings: The contractor shall utilize service openings, as required for proper cleaning, at various points of the HVAC system for physical and mechanical entry, and inspection.

1. Contractor shall utilize the existing service openings already installed in the HVAC system where possible.
2. Other openings shall be created where needed and they must be created so that they can be sealed in accordance with industry codes and standards.
3. Closures must not significantly hinder, restrict, or alter the airflow within the system.
4. Closures must be properly insulated to prevent heat loss/gain or condensation on surfaces within the system.
5. Openings must not compromise the structural integrity of the system.
6. Construction techniques used in the creation of openings should conform to requirements of applicable building and fire codes, and applicable NFPA, SMACNA and NADCA Standards.
7. Cutting service openings into flexible duct is not permitted. Flexible duct shall be disconnected at the ends as needed for proper cleaning and inspection.
8. All service openings capable of being re-opened for future inspection or remediation shall be clearly marked.

G. Ceiling section (tile): The contractor may remove and reinstall ceiling sections to gain access to HVAC systems during the cleaning process.

H. Air distribution devices (registers, grilles & diffusers): The contractor shall clean all air distribution devices.

I. Air handling units, terminal units, blowers and exhaust fans: The contractor shall insure that supply, return, and exhaust fans and blowers are thoroughly cleaned. Areas to be cleaned include blowers, fan housings, plenums, scrolls, blades, or vanes, shafts baffles, dampers and drive assemblies. All visible surface contamination deposits shall be removed in accordance with NADCA Standards. Contractor shall:

1. Contact clean all air handling unit (AHU) internal surfaces, components and condensate collectors and drains.
2. Assure that a suitable operative drainage system is in place prior to beginning wash down procedures.
3. Clean all coils and related components, including evaporator fins.

J. Duct System: Contractor shall:

1. Create service opening in the system as necessary in order to accommodate cleaning of otherwise inaccessible areas.
2. Contact vacuum all duct systems to remove all visible contaminants, such that the systems are capable of passing Cleaning Verification Testing (see NADCA Standards). Air Whipping, Air Washing, Air Lancing, Rotary Brush Cleaning, Robotics and similar cleaning methods will not be allowed unless the ductwork is inaccessible due to hard ceilings or they are Ain-slab constructed. Only contact vacuuming, utilizing portable hepa filtered vacuumes, will be allowed.

2.4 Health and Safety

A. Safety Standards: Cleaning contractors shall comply with all applicable federal state, and local requirements for protecting the safety of the contractors' employees, building occupants, and the environment. In Particular, all applicable standards of the Occupational Safety and Health Administration (OSHA) shall be followed when working in accordance with this specification.

B. Occupant Safety: No processes or materials shall be employed in such a manner that they will introduce additional hazards into occupied spaces.

C. Disposal or Debris: All Debris removed from the HVAC System shall be disposed of in accordance with applicable federal, state and local requirements.

2.5 Mechanical Cleaning Methodology

A. Source Removal Cleaning Methods: The HVAC system shall be cleaned using Contact Vacuuming methods designed to extract contaminants from within the HVAC system and safely remove contaminant from the facility. No cleaning method, or combination of methods, shall be used which could potentially damage components of the HVAC system or negatively alter the integrity of the system.

1. All methods used shall incorporate the use of vacuum collection devices that are operated continuously during cleaning. A vacuum device shall be connected to the downstream end of the section being cleaned through a predetermined opening. The vacuum collection device must be of sufficient power to render all areas being cleaned under negative pressure, such that containment of debris and the protection of the indoor environment is assured.
2. All vacuum devices shall be equipped with HEPA filters (minimum efficiency), including hand-held vacuums and wet-vacuums.
3. All vacuum devices exhausting air outside the facility shall be equipped with Particulate Collection including adequate filtration to contain Debris remove from the HVAC system. Such devices shall exhaust in a manner that will not allow contaminants to re-enter the facility. Release of debris outdoors must not violate any outdoor environmental standards, codes and regulations.
4. All methods require contact vacuuming to dislodge debris adhered to interior HVAC system surfaces, such that debris may safely enter the vacuum collection device at the point of agitation.

B. Methods of Cleaning Fibrous Glass Insulated Components:

1. Fibrous glass thermal or acoustical insulation elements present in any equipment or ductwork shall be thoroughly contact cleaned with HEPA vacuuming equipment, while the HVAC system in under constant negative pressure, and not permitted to get wet in accordance with applicable NADCA and NAI MA standards and recommendations.
2. Cleaning methods used shall not cause damage to fibrous glass components and will render the system capable of passing Cleaning Verification Tests (see NADCA Standards).

C. Damaged Fibrous Glass Material:

1. If there is any evidence of damage, deterioration, delamination, friable material, mold or fungus growth, or moisture such that fibrous glass materials cannot be restored by cleaning or resurfacing with an acceptable insulation repair coating, they shall be identified to the owner’s agent.

D. Cleaning of coils:

1. Any cleaning method may be used which will render the Coil Visibly Clean and capable of passing Coil Cleaning Verification (see applicable NADCA Standards). Coil drain pans shall be subject to Non-Porous Surfaces Cleaning Verification. The drain for the condensate drain pan shall be operational.

Cleaning methods shall not cause any appreciable damage to, displacement of, inhibit heat transfer, or erosion of the coil surface or fins, and shall conform to coil manufacturer recommendations when available. Coil shall be thoroughly rinsed with clean water to remove any latent residues.

2.6 Cleanliness Verification

A. General: Verification of HVAC System cleanliness will be determined after mechanical cleaning.

B. Visual Inspection: The HVAC system shall be inspected visually to ensure that now visible contaminants are present.

1. If no contaminants are evident through visual inspection, the HVAC system shall be considered clean; however the owner reserves the right to further verify system cleanliness through gravimetric or wipe testing analysis testing as specified herein.
2. If visible contaminants are evident through visual inspection, those portions of the system where contaminants are visible shall be re-cleaned and subjected to re-inspection for cleanliness.

C. Gravimetric Analysis: At the discretion and expense (see below) of the owner, sections of the HVAC system may be tested for clenliness using the NADCA Vacuum Test (gravimetric analysis) as specified in applicable NADCA Standards. Levels of debris collected shall be equal to or less than acceptable levels defined in applicable NADCA Standards.

1. If gravimetric analysis determines that levels of debris are equal to or lower than those levels specified in applicable NADCA standards, the system shall be considered clean and shall have passed cleanliness verification.
2. If gravimetric analysis determines that levels of debris exceed those specified in applicable NADCA standards, the system shall not be considered clean and those sections of the system which failed cleanliness verification shall be re-cleaned at the expense of the HVAC system cleaning contractor and gravimetric analysis tested expense re-paid to owner.
3. Gravimetric analysis shall be performed by a qualified third party experienced in testing of this nature.
4. Cleanliness verification shall be performed immediately after mechanical cleaning and before the HVAC system is restored to normal operation.

D. Verification of Coil Cleaning:

1. Cleaning must restore the coil pressure drop within 10 percent of the pressure drop measured when the coil was first installed. If the original pressure drop is not known, the coil will be considered clean only if the coil is free of foreign matter and chemical residue, based on a thorough visual inspection (see NADCA Standards).

2.7 Post-Project Report

A. At the conclusion of the project, the Contractor shall provide a report to the owner indication the following:

1. Success of the cleaning project, as verified through visual inspection and/or gravimetric analysis.
2. Areas of the system found to be damaged and/or in need of repair.

2.8 Applicable Standards and Publications:

A. The following current standards and publications of the issues currently in effect form a part of this specification to the extent indicated by any referenced thereto:

1. National Air Duct Cleaners Association (NADCA): Nada ALR 2002, Mechanical Cleaning of Non-Porous Air Conveyance System Components, 1992.
2. National Air Duct Cleaners Association (NADCA): Understanding Microbial Contamination in HVAC Systems, 1996.
3. National Air Duct Cleaners Association (NADCA): Introduction to HVAC System Cleaning Services, 1995.
4. National Air Duct Cleaners Association (NADCA): NADCA Standard 05. Requirements for the installation of Service Openings in HVAC Systems, 1997.
5. Underwriters Laboratories (UL): UL Standard 181.
6. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE): Standard 62-89, Ventilation for Acceptable Indoor Air Quality.
7. Environmental Protection Agency (EPA): Building Air Quality - December, 1991.
8. Sheet Metal and Air Conditioning Contractors- National Association (SMACNA): HVAC Duct Construction Standards – Metal and Flexible, 1985.
9. North American Insulation Manufacturers Association (NAIMA): Cleaning Fibrous Glass Insulated Air Duct Systems. 1993.

PART 3 - EXECUTION

3.1 Cleaning

A. Thoroughly clean ducts and equipment of foreign substances before making operational.

B. Any part of a system stopped by foreign matter after being placed in operation, to be disconnected, cleaned and reconnected to locate and remove obstructions. Work damaged in the course of removing obstructions will be repaired or replaced at no additional cost to the Owner.

C. Cap all ducts and pipes to protect against entrance of foreign matter.

D. Remove rubbish, debris, and excess materials. Remove oil and grease stains on floor areas.

END OR SECTION 15920

SECTION 16010

BASIC ELECTRICAL REQUIREMENTS

FILED SUB-BID

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this and the other sections of Division 16.

1.2 SUMMARY

A. This Section includes general administrative, procedural, and other requirements for electrical installations. The following requirements are included in this Section to expand the requirements specified in Divisions 1 through 16:

1. Submittals.
2. Quality control.
3. Definitions and abbreviations.
4. Scheduling.
5. Coordination drawings.
6. Record documents.
7. Maintenance manuals.
8. Delivery, storage, and handling.
9. Products.
10. Rough-ins.
11. Electrical installations.
12. Permits and instructions.
13. Field quality control.
14. Protection.
145. Additional work.
156. Electrical schedules.
167. Cutting and patching.

1.3 SUBMITTALS

A. General: Follow the procedures specified in Division 1.

B. Increase, by the quantity listed below, the number of electrical related shop drawings, product data, and samples submitted, to allow for required distribution plus two copies of each submittal required, which will be retained by the Electrical Consulting Engineer.

1. Shop Drawings - Initial Submittal: 1 additional blue- or black-line prints.
2. Shop Drawings - Final Submittal: 1 additional blue- or black-line prints.
3. Product Data: 1 additional copy of each item.
4. Samples: 1 addition as set.

C. Additional copies may be required by individual sections of these Specifications.

1.4 QUALITY CONTROL

A. Functional and Operational Test Procedure:
   1. Test procedure to completely test all systems as to their functional and sequential operation.
   2. Submit two (2) draft copies for review before conducting test.
   3. Certify that the test procedure was used and testing completed, and that all systems are operational and functioning properly.
   4. Submit certified Test Procedure for review prior to the date of final inspection.
   5. Systems to be covered by test procedure:
      a. Power Distirbution
      b. Equipment shut-down requirements

B. Other Tests and Certifications for:
   1. Grounding System: As specified under Section 16452.

1.5 DEFINITIONS AND ABBREVIATIONS

A. Electrical Definitions: As defined by MEC, Article 100.

B. The term "indicated" shall mean "as shown on contract documents (specifications, drawings, and related attachments)".

C. The term "provide" shall mean "to furnish, install and connect completely".

D. The term "size" shall mean one or more of the following: "length, current and voltage rating, number of poles, NEMA size, and other similar electrical characteristics".

E. The term "space" on panelboard and switchboard schedules shall mean "provide space to install the number of poles and size of the protective device indicated with all the necessary buss and fittings to install the device at some future date".

1.6 SCHEDULING

A. Coordinate electrical work with other divisions of this project.

B. Coordinate electrical work with Owner.

C. Written requests for approval for planned shutdowns or interruption of Owner's operation or equipment shall be made 72 hours prior to the start of the requested periods.

D. Written notification for on site training of Owner's personnel shall be made 1 week prior to the start of the requested training period.

1.7 COORDINATION DRAWINGS

A. Prepare coordination drawings in accordance with Division 1 to a scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of electrical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:

1. Indicate the proposed locations of major raceway systems, equipment, and materials. Include the following:
   a. Clearances for servicing equipment, including space for equipment disassembly required for periodic maintenance.
   b. Fire-rated wall and floor penetrations.
   c. Equipment connections and support details.

2. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
3. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
4. Prepare reflected ceiling plans to coordinate and integrate installations, air outlets and inlets, light fixtures, raceway systems components, Exhaust/Kitchen hoods, and other ceiling-mounted devices.

1.8 RECORD DOCUMENTS

A. Prepare record documents in accordance with the requirements in Division 1. In addition to the requirements specified in Division 1, indicate installed conditions for:

1. Major raceway systems, size and location, for both exterior and interior; locations of control devices; distribution and branch electrical circuitry; and fuse and circuit breaker size and arrangements.
2. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
3. Approved substitutions, Contract Modifications, and actual equipment and materials installed.

1.9 MAINTENANCE MANUALS

A. Prepare maintenance manuals in accordance with Division 1. In addition to the requirements specified in Division 1, include the following information for equipment items:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.

3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
4. Servicing instructions and lubrication charts and schedules.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Unless otherwise indicated, all electrical equipment has been based on General Electric products.

B. As specified under other RELATED SECTIONS. Comparable manufacturers may be utilized, and include the following:
1. Eaton Corp.
2. Siemens
3. Square D

C. As specified on Drawings.

2.2 MATERIAL

A. General:
1. Unless otherwise indicated, all raceways for service, feeders, branch and control wiring are RSC or IMC. See Section 16110.
2. Unless otherwise indicated, wiring to equipment and motors may be installed in liquid tight flexible conduit, or in interior locations in flexible metal conduit, with a maximum length of six (6) feet.
3. Unless otherwise indicated, all conductors to be copper THHN/THWN-2.
4. Unless otherwise indicated, all outlet and switch boxes to be cast iron with threaded hubs.
5. In interior protected locations, where recessed in ceiling and walls, outlet and switch boxes may be stamped steel.
6. Unless otherwise indicated, provide heavy duty grade, 20 ampere, receptacles and switches. Provide associated cover plates. Plates exposed to weather or water to be metal, weatherproof type. Coordinate device and cover plate color with Architect/Owner.

B. As specified under RELATED SECTIONS.

C. As specified on Drawings.

2.3 EQUIPMENT

A. General:

1. Unless otherwise indicated, externally operated safety switches are unfused, solid neutral, heavy duty, and selected to meet the load requirements.

B. As specified under RELATED SECTIONS.

C. As specified on Drawings.

2.4 FABRICATION

A. General:

1. Unless otherwise indicated, all enclosures are NEMA Type 1. NEMA Type 3R shall be used for wet/damp locations.

B. As specified under RELATED SECTIONS.

C. As specified on Drawings.

PART 3 EXECUTION

3.1 ROUGH-IN

A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

B. Refer to equipment specifications in Divisions 2 through 16 for rough-in requirements.

C. Contractor is to provide connections, both power and control as noted, for kitchen equipment. Kitchen equipment indicated on drawings is to be supplied by others. Division 16 shall coordinate the respective installations with the supplier and agency.

3.2 ELECTRICAL INSTALLATIONS

A. General: Sequence, coordinate, and integrate the various elements of electrical systems, materials, and equipment. Comply with the following requirements:

1. Coordinate electrical systems, equipment, and materials installation with other building components. Electrical plans and details do not show all interferences and conditions, visible and/or hidden, that may exist. Before selecting material and equipment, and proceeding with work, inspect areas where material and equipment are to be installed to insure suitability, and check needed space for placements, clearances and interconnections. Before cutting or drilling into building elements inspect and layout work to avoid damaging structural elements or building utilities.
2. Electrical plans, details, and diagrams show the general location and arrangement of electrical systems. They are diagrammatic and do not show all conduit bodies, connectors, bends, fittings, hangers, and additional pull and junction boxes which the Contractor must provide to complete the electrical system.
3. Verify all dimensions by field measurements.

4. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for electrical installations.
5. 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.
6. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building. Verify dimensional constraints of building door openings and passageways, and the maximum floor loadings, for the movement of selected material and equipment. Order equipment and material, broken down as may be required, to meet these constraints.
7. Measurement from above finished floor (AFF) shall be taken from the finished floor surface to the top of wall receptacles and switch boxes, to the centerline of wall lighting outlet boxes, to the top of wall mounted equipment enclosures, to the centerline of top most switch handle, or to the lowest surface of ceiling lighting fixtures and other ceiling mounted equipment.
   a. Unless otherwise indicated, wall switch boxes shall be 46 inches AFF.
   b. Unless otherwise indicated, receptacle boxes shall be 18 inches AFF. Receptacle mounted above counter and at furniture locations shall be coordinated with architectural elements. Coordinate with Architect.
   c. Surface raceway heights shall be coordinated with Architectural requirements.

8. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible. Switch and receptacle heights shall meet handicap accessible code requirements.
9. Coordinate connection of electrical systems with incoming utilities and services. Comply with requirements of governing regulations, power, telephone, and data service companies, and controlling agencies. Provide required connection for each service. Provide power connection to equipment. Coordinate with other Divisions.
10. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Engineer.
11. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
12. Conduit Sizing:
    a. Unless otherwise indicated, conduit size for indicated conductor shall be based on Chapter 9 of MEC.
    b. Conduit: 1/2 inch minimum size.
    c. Surface Raceway: Wiremold V700.

13. Install electrical equipment to facilitate servicing, 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. Measure and locate placement of equipment and materials in relation to building structure and surfaces, and between equipment to be installed and wired. Maintain required minimum access spacing for equipment and enclosures.
14. Install access panel or doors where units are concealed behind finished surfaces. Access panels and doors are specified elsewhere.
15. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

3.3 PERMITS AND INSPECTIONS

A. Obtain and pay for all required permits and arrange for all required inspections in accordance with state and local governing authorities.

B. Final Electrical Inspection Certificate from inspection agency or governing authority.

3.4 FIELD QUALITY CONTROL

A. Perform field tests as specified under other electrical sections.

B. Arrange for local Inspection Authorities to inspect work performed prior to burial, closing-in behind wall and above ceiling, or encased in concrete. Also arrange for final inspection of work and obtain Final Inspection Certificate before final inspection of work by Owner or his representative.

3.5 PROTECTION

A. Protect personnel from coming in contact with live parts.

B. During remodeling or alteration work, maintain fire ratings of walls, floors and ceilings when work is left unattended.

C. Protect from damage and theft equipment and materials provided or supplied by others in accordance with manufacturer's recommendation and warranties, and with electrical standards and practices.

3.6 ADDITIONAL WORK

A. Provide connections for power and controls to mechanical equipment being supplied under other divisions.

B. Provide power and control wiring to exhaust equipment.

3.7 ELECTRICAL SCHEDULES

A. As specified in related sections or shown on drawings.

3.8 CUTTING AND PATCHING

A. General: Perform cutting and patching in accordance with Division 1. In addition to the requirements specified in Division 1, the following requirements apply:

1. Perform cutting, fitting, and patching of electrical equipment and materials required to:
   a. Uncover Work to provide for installation of ill-timed Work.
   b. Remove and replace defective Work.
   c. Remove and replace Work not conforming to requirements of the Contract Documents.
   d. Remove samples of installed Work as specified for testing.
   e. Install equipment and materials in existing structures.
   f. Upon written instructions from the Engineer, uncover and restore Work to provide for Engineer observation of concealed Work.

2. Cut, remove, and legally dispose of selected electrical equipment, components, and materials as indicated, including but not limited to removal of electrical items indicated to be removed and items made obsolete by the new Work.
3. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
4. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
5. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.
6. Patch existing finished surfaces and building components using new materials matching existing materials and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.
7. Patch finished surfaces and building components using new materials specified for the original installation and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.

END OF SECTION 16010

SECTION 16050

BASIC ELECTRICAL MATERIALS AND METHODS

FILED SUB-BID

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

B. Requirements specified in other Division 16 Sections apply to this section.

1.2 SUMMARY

A. This Section includes limited scope general construction materials and methods for application with electrical installations as follows:
   1. Selective demolition including:
      a. Nondestructive removal of materials and equipment for reuse or salvage as indicated.
      b. Dismantling electrical materials and equipment made obsolete by these installations.
   2. Miscellaneous metals for support of electrical materials and equipment.
   3. Fire rated wood grounds, nailers, blocking, fasteners, and anchorage for support of electrical materials and equipment.
   4. Joint sealers for sealing around electrical materials and equipment; and for sealing penetrations in fire and smoke barriers, floors, and foundation walls.
   5. Access panels and doors in walls, ceilings, and floors for access to electrical materials and equipment.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for the following products:
   1. Access panels and doors.
   2. Joint sealers.

C. Shop drawings detailing fabrication and installation for metal fabrications, and wood supports and anchorage for electrical materials and equipment.

D. Coordination drawings for access panel and door locations in accordance with Division 16 Section "Basic Electrical Requirements."

E. Samples of joint sealer, consisting of strips of actual products showing full range of colors available for each product.

F. Welder certificates, signed by Contractor, certifying that welders comply with requirements specified under "Quality Assurance" article of this Section.

G. Schedules indicating proposed methods and sequence of operations for selective demolition prior to commencement of Work. Include coordination for shut-off of electrical service, and details for dust and noise control.
   1. Coordinate sequencing with construction phasing and Owner occupancy specified in Division 1.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer for the installation and application of joint sealers, access panels, and doors.

B. Qualify welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code - Steel."
   1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

C. Fire-Resistance Ratings: Where a fire-resistance classification is indicated, provide access door assembly with panel door, frame, hinge, and latch from manufacturer listed in the UL "Building Materials Directory" for rating shown.
   1. Provide UL Label on each fire-rated access door.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver joint sealer materials in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.

B. Store and handle joint sealer materials in compliance with the manufacturers' recommendations to prevent their deterioration and damage.

1.6 PROJECT CONDITIONS

A. Conditions Affecting Selective Demolition: The following project conditions apply:
   1. Protect adjacent materials indicated to remain or in the other phases of the proposed construction. Install and maintain dust and noise barriers to keep dirt, dust, and noise from being transmitted to adjacent areas. Remove protection and barriers after demolition operations are complete.
   2. Locate, identify, and protect electrical services passing through demolition area and serving other areas outside the demolition limits. Maintain services to areas outside demolition limits. When services must be interrupted, install temporary services for affected areas.

3. Arrange for electric service change-overs during periods when the building is not occupied. This may include week-ends and evening hours. Coordinate with Owner's representatives.

B. Environmental Conditions: Apply joint sealers under temperature and humidity conditions within the limits permitted by the joint sealer manufacturer. Do no apply joint sealers to wet substrates.

1.7 SEQUENCE AND SCHEDULING

A. Coordinate the shut-off and disconnection of electrical power with the Owner.

B. Notify the Engineer at least 5 days prior to commencing demolition operations.

C. Perform demolition in sequencing/phases as noted and as required.

PART 2 PRODUCTS

2.1 MISCELLANEOUS METALS

A. Steel plates, shapes, bars, and bar grating: ASTM A 36.

B. Cold-Formed Steel Tubing: ASTM A 500.

C. Hot-Rolled Steel Tubing: ASTM A 501.

D. Steel Pipe: ASTM A 53, Schedule 40, welded.

E. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout, recommended for interior and exterior applications.

F. Fasteners: Zinc-coated, type, grade, and class as required.

2.2 MISCELLANEOUS LUMBER

A. Framing Materials: Standard Grade, light-framing-size lumber of any species. Number 3 Common or Standard Grade boards complying with WCLIB or AWPA rules, or Number 3 boards complying with SPIB rules. Lumber shall be preservative treated in accordance with AWPB LP-2, and kiln dried to a moisture content of not more than 19 percent.

B. Construction Panels: Plywood panels; APA C-D PLUGGED INT, with exterior glue; thickness as indicated, or if not indicated, not less that 3/4 inches.

2.3 JOINT SEALER

A. General: Joint sealers, joint fillers, and other related materials compatible with each other and with joint substrates under conditions of service and application.

B. Colors: As selected by the Architect from manufacturer's standard colors.

C. Elastomeric Joint Sealers: Provide the following types:
   1. One-part, nonacid-curing, silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25, for uses in non-traffic areas for masonry, glass, aluminum, and other substrates recommended by the sealant manufacturer.
   2. One-part, mildew-resistant, silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25, for uses in non-traffic areas for glass, aluminum, and nonporous joint substrates; formulated with fungicide; intended for sealing interior joints with nonporous substrates; and subject to in-service exposure to conditions of high humidity and temperature extremes.
   3. Available Products: Subject to compliance with requirements, products which may be incorporated in the Work include, but are not limited to, the following:
      a. One-Part, Nonacid-Curing, Silicone Sealant:
         1) Bostik - "Chem-Caulk 2000"
         2) Dow Corning - "Dow Corning 790"
         3) Pecora Corp – “864NST”

      b. One-Part, Mildew-Resistant, Silicone Sealant:
         1) Dow Corning - "Dow Corning 786"
         2) GE - "SCS 1702”
         3) Pecora Corp. - "898”

D. Acrylic-Emulsion Sealants: One-part, nonsag, mildew-resistant, paintable complying with ASTM C 834 recommended for exposed applications on interior and protected exterior locations involving joint movement of not more than plus or minus 5 percent.
   1. Available Products: Subject to compliance with requirements, products which may be incorporated in the Work include, but are not limited to, the following:
      a. Bostik - "Chem-Caulk 600"
      b. Pecora Corp. - "AC-20"
      c. Tremco – “Tremflex 834”

E. Fire-Resistant Joint Sealers: Two-part, foamed-in-place, silicone sealant formulated for use in through-penetration fire-stopping around cables, conduit, pipes, and duct penetrations through fire- rated walls and floors. Sealants and accessories shall have fire- resistance ratings indicated, as established by testing identical assemblies in accordance with ASTM E 814, by Underwriters' Laboratories, Inc., or other testing and inspection agency acceptable to authorities having jurisdiction.
   1. Available Products: Subject to compliance with requirements, products which may be incorporated in the Work include, but are not limited to, the following:
      a. Dow Corning - "Dow Corning Fire Stop Foam"
      b. GE - "Pensil 851"
      c. Hilti – “CP-620 Fire Stop Foam”

2.4 ACCESS DOORS

A. Steel Access Doors and Frames: Factory-fabricated and assembled units, complete with attachment devices and fasteners ready for installation. Joints and seams shall be continuously welded steel, with welds ground smooth and flush with adjacent surfaces.

B. Frames: 16-gage steel, with a 1-inch-wide exposed perimeter flange for units installed in unit masonry, pre-cast, or cast-in-place concrete, ceramic tile, or wood paneling.
   1. For installation in masonry, concrete, ceramic tile, or wood paneling: 1 inch-wide-exposed perimeter flange and adjustable metal masonry anchors.
   2. For gypsum wallboard or plaster: perforated flanges with wallboard bead.
   3. For full-bed plaster applications: galvanized expanded metal lath and exposed casing bead, welded to perimeter of frame.

C. Flush Panel Doors: 14-gage sheet steel, with concealed spring hinges or concealed continuous piano hinge set to open 175 degrees; factory-applied prime paint.
   1. Fire-Rated Units: Insulated flush panel doors, with continuous piano hinge and self-closing mechanism.

D. Locking Devices: Flush, screwdriver-operated cam locks.

E. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:
   1. Bar-Co., Inc.
   2. J.L. Industries.
   3. Karp Associates, Inc.
   4. Milcor Div. Inryco, Inc.
   5. Nystrom, Inc.

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 installation and application of joint sealers and access panels. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION FOR JOINT SEALER

A. Surface Cleaning for Joint Sealers: Clean surfaces of joints immediately before applying joint sealers to comply with recommendations of joint sealer manufacturer.

B. Apply joint sealer primer to substrates as recommended by joint sealer manufacturer. Protect adjacent areas from spillage and migration of primers, using masking tape. Remove tape immediately after tooling without disturbing joint seal.

3.3 ERECTION OF METAL SUPPORTS AND ANCHORAGE

A. Cut, fit, and place miscellaneous metal fabrications accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

B. Field Welding: Comply with AWS "Structural Welding Code."

3.4 ERECTION OF WOOD SUPPORTS AND ANCHORAGE

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorage accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

B. Select fastener sizes that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

D. Do not install wood materials in areas being utilized as air plenum or other spaces where a potential combustible hazard exists.

3.5 APPLICATION OF JOINT SEALERS

A. General: Comply with joint sealer manufacturers' printed application instructions applicable to products and applications indicated, except where more stringent requirements apply.
   1. Comply with recommendations of ASTM C 962 for use of elastomeric joint sealants.
   2. Comply with recommendations of ASTM C 790 for use of acrylic- emulsion joint sealants.

B. Tooling: Immediately after sealant application and prior to time shinning or curing begins, tool sealants to form smooth, uniform beads; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

C. Installation of Fire-Stopping Sealant: Install sealant, including forming, packing, and other accessory materials, to fill openings around electrical services penetrating floors and walls, to provide fire-stops with fire-resistance ratings indicated for floor or wall assembly in which penetration occurs. Comply with installation requirements established by testing and inspecting agency.

3.6 INSTALLATION OF ACCESS DOORS

A. Set frames accurately in position and securely attached to supports, with face panels plumb and level in relation to adjacent finish surfaces.

B. Adjust hardware and panels after installation for proper operation.

END OF SECTION 16050

SECTION 16110

RACEWAYS

FILED SUB-BID

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

B. Requirements specified in other Division 16 Sections apply to this Section.

1.2 SUMMARY

A. This Section includes raceways for electrical wiring. Types of raceways in this section include the following:
   1. Rigid metal conduit.
   2. Intermediate metal conduit.
   3. Liquidtight flexible conduit.
   4. Flexible metal conduit.
   5. Electrical Metallic Tubing (EMT).
   6. Wireways.

B. Related Sections: The following Division 16 Sections contain requirements that relate to this Section:
   1. "Wires and Cables" for other wiring methods.
   2. "Supporting Devices" for raceway supports.
   3. "Cabinets, Boxes, and Fittings" for boxes used with conduit and tubing systems.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product Data for the following products:
   1. Raceway system.

C. Installation Instructions: Manufacturer's written installation instructions for wireway, and raceway products.

1.4 QUALITY ASSURANCE

A. Electrical Component Standard: Components and installation shall comply with MEC "Massachusetts Electrical Code."

B. NEMA Compliance: Comply with applicable requirements of NEMA standards pertaining to raceways.

C. UL Compliance and Labeling: Comply with applicable requirements of UL standards pertaining to electrical raceway systems. Provide raceway products and components listed and labeled by UL, ETL, or CSA.

1.5 SEQUENCING AND SCHEDULING

A. Coordinate with other Work, including metal and concrete deck installation, as necessary to interface installation of electrical raceways and components with other Work.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

B. Conduit Bodies:
1. Appleton Electric Co.
2. Killark Electric Mfg. Co.
3. O-Z/Gedney
4. Spring City Electrical Mfg. Co.

C. Wireways:
1. Erickson Electric Equipment Co.
2. GS Metals Corp.
3. Hoffman Engineering Co.

2.2 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit: ANSI C80.1.

B. Intermediate Steel Conduit: UL 1242.

C. Electrical Metallic Tubing and Fittings: ANSI C80.3

D. Flexible Metal Conduit: UL 1, zinc-coated steel.

E. Liquid-tight Flexible Metal Conduit and Fittings: UL 360. Fittings shall be specifically approved for use with this raceway.

2.3 CONDUIT BODIES

A. General: Types, shapes, and sizes as required to suit individual applications and NEC requirements. Provide matching gasketed covers secured with corrosion-resistant screws.

B. Metallic Conduit and Tubing: Use metallic conduit bodies. Use bodies with threaded hubs for threaded raceways.

C. Conduit Bodies 1 Inch and Smaller: Use bodies with compression- type threaded connectors.

2.4 WIREWAYS

A. General: Electrical wireways shall be of types, sizes, and number of channels indicated. Fittings and accessories including but not limited to couplings, offsets, elbows, expansion joints, adapeters, hold-down straps, and end caps shall match and mate with wireway as required for completed system. Where features are not indicated, select to fulfill wiring requirements and comply with applicable provisions of MEC.

B. Wireway covers to be hinged type.

PART 3 EXECUTION

3.1 WIRING METHOD

A. Outdoors: Use the following wiring methods:
   1. Exposed / Concealed: Rigid metal conduit, Intermediate metal conduit.
   2. Connection to Vibrating Equipment: Including transformers and hydraulic, pneumatic, or electric solenoid or motor-driven equipment: liquidtight flexible metal conduit. Maximum length six (6) feet.

B. Indoors: Use the following wiring methods:
   1. Connection to Vibrating Equipment: Including transformers and hydraulic, pneumatic or electric solenoid or motor-operated equipment: Flexible metal conduit. Maximum length six (6) feet.
   2. Exposed/Concealed in unfinished areas: branch circuits: EMT.
   3. Connection to vibrating equipment and hydraulic, pneumatic, or electric solenoid or motor-driven equipment in moist or humid location or corrosive atmosphere, or where subject to water spray or dripping oil, grease, or water: Liquidtight flexible metal conduit. Maximun length six (6) feet.
   4. In finished areas where conduit cannot be concealed: Wiremold surface raceway.

3.2 INSTALLATION

A. General: Install electrical raceways in accordance with manufacturer's written installation instructions, applicable requirements of MEC, and as follows:

B. Conceal Conduit, unless indicated otherwise, within finished walls, ceilings, and floors. Keep raceways at least 6 inches away from parallel runs of flues and hot water pipes. Install raceways level and square and at proper elevations.

C. Elevation of Raceway: Where possible, install horizontal raceway runs above water and sanitary piping.

D. Complete installation of electrical raceways before starting installation of conductors within raceways.

E. Provide supports for raceways as specified elsewhere in Division 16.

F. Prevent foreign matter from entering raceways by using temporary closure protection.

G. Protect stub-ups from damage where conduits rise from floor slabs. Arrange so curved portion of bends is not visible above the finished slab.

H. Make bends and offsets so the inside diameter is not effectively reduced. Unless otherwise indicated, keep the legs of a bend in the same plane and the straight legs of offsets parallel.

I. Use raceway fittings that are of types compatible with the associated raceway and suitable for the use and location. For intermediate steel conduit, use threaded rigid steel conduit fittings except as otherwise indicated.

J. Run concealed raceways with a minimum of bends in the shortest practical distance considering the type of building construction and obstructions except as otherwise indicated.

K. Install exposed raceways parallel and perpendicular to nearby surfaces or structural members and follow the surface contours as much as practical.

L. Run exposed, parallel, or banked raceways together. Make bends in parallel or banked runs from the same center line so that the bends are parallel. Factory elbows may be used in banked runs only where they can be installed parallel. This requires that there be a change in the plane of the run such as from wall to ceiling and that the raceways be of the same size. In other cases provide field bends for parallel raceways.

M. Join raceways with fittings designed and approved for the purpose and make joints tight. Where joints cannot be made tight, use bonding jumpers to provide electrical continuity of the raceway system. Make raceway terminations tight. Where terminations are subject to vibration, use bonding bushings or wedges to assure electrical continuity. Where subject to vibration or dampness, use insulating bushings to protect conductors.

N. Tighten set screws of threadless fittings with suitable tool.

O. Terminations: Where raceways are terminated with locknuts and bushings, align the raceway to enter squarely and install the locknuts with dished part against the box. Where terminations cannot be made secure with one locknut, use two locknuts, one inside and one outside the box.

P. Where terminating in threaded hubs, screw the raceway or fitting tight into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align the raceway so the coupling is square to the box, and tighten the chase nipple so no threads are exposed.

Q. Install pull wires in empty raceways. Use no. 14 AWG zinc-coated steel or monofilament plastic line having not less than 200-lb tensile strength. Leave not less than 12 inches of slack at each end of the pull wire.

R. Install raceway sealing fittings in accordance with the manufacturer's written instructions. Locate fittings at suitable, approved, accessible locations and fill them with UL- listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points and elsewhere as indicated:
   1. Where conduits pass from warm locations to cold locations, such as the boundaries of conditioned spaces and mechanical spaces.
   2. Where required by the MEC.

S. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment with an adjustable top or coupling threaded inside for plugs and set flush with the finished floor. Extend conductors to equipment with rigid steel conduit; flexible metal conduit may be used 6 inches above the floor.

T. Flexible Connections: Use short length (maximum of 6 ft.) of flexible conduit for recessed and semirecessed lighting fixtures, for equipment subject to vibration, noise transmission, or movement; and for all motors. Use liquidtight flexible conduit in wet locations. Install separate ground conductor across flexible connections. Light fixture flexible connections shall not exceed 15 ft.

3.3 ADJUSTING AND CLEANING

A. Upon completion of installation of raceways, inspect interiors of raceways; clear all blockages and remove burrs, dirt, and construction debris.

B. Paint Finish: Repair damage using surface raceway manufacturer's touch-up paint.

END OF SECTION 16110

SECTION 16120

WIRES AND CABLES

FILED SUB-BID

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

B. Requirements of other specified Division 16 Sections apply to this section.

1.2 SUMMARY

A. This Section includes wires, cables, and connectors for power, lighting, signal, control and related systems rated 600 volts and less.

1.3 SUBMITTALS

A. Product Data for electrical wires, cables and connectors.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with provisions of the following code:

B. MEC "Massachusetts Electrical Code."
   1. Conform to applicable codes and regulations regarding toxicity of combustion products of insulating materials.

C. UL Compliance: Provide components which are listed and labeled by UL under the following standards.
   1. UL Std. 83 Thermoplastic-Insulated Wires and Cables.
   2. UL Std. 486A Wire Connectors and Soldering Lugs for Use with Copper Conductors.
   3. UL Std. 1569 Metal Clad Cable.

D. NEMA/ICEA Compliance: Provide components which comply with the following standards:
   1. WC-5 Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

E. IEEE Compliance: Provide components which comply with the following standard.
   1. Std. 82 Test procedures for Impulse Voltage Tests on Insulated Conductors.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
   1. Wire and Cable:
      a. AFC Cable Systems
      b. General Cable
      c. Southwire Company

   2. Connectors for Wires and Cable Conductors:
      a. AMP
      b. 3M Company
      c. O-Z/Gedney Co.
      d. Square D Company.

2.2 WIRES AND CABLES

A. General: Provide wire and cable suitable for the temperature, conditions and location where installed.

B. Conductors: Provide stranded conductors for power and lighting circuits no. 10 AWG and smaller. Provide stranded conductors for sizes no. 8 AWG and larger.

C. Conductor Material: copper for all wires and cables.

D. Conductor sizes indicated are based on copper.

E. Insulation: Provide THHN/THWN-2 insulation for all conductors size 500MCM and larger, and no. 8 AWG and smaller. For all other sizes provide, THHN/THWN-2 or XHHW insulation as appropriate for the locations where installed.

F. Color Coding for phase identification in accordance with Table 1 in Part 3 below.

G. Jackets: Factory-applied nylon or PVC external jacketed wires and cables for pulls in raceways over 100-feet in length, for pulls in raceways with more than three equivalent 90 deg. bends, for pulls in conduits underground or under slabs on grade, and where indicated.

H. Cables: Provide the following type(s) of cables in MEC approved locations and applications where indicated. Provide cable UL listed for particular application:
   1. Metal-Clad Cable: Type MC - limited to lighting fixtures and outlets concealed in gypsum wall partitions.
   2. Metal clad above ceilings to be limited to five (5) feet whips.
   3. Provided acceptable to AHJ, Contractor may utilize Nonmetallic-Sheathed Cable: Type NMC concealed behind finished walls and ceilings.

2.3 CONNECTORS FOR CONDUCTORS

A. Provide UL-listed factory-fabricated, solderless metal connectors of sizes, ampacity ratings, materials, types and classes for applications and for services indicated. Use connectors with temperature ratings equal to or greater than those of the wires upon which used.

PART 3 EXECUTION

3.1 WIRING METHOD

A. Use the following wiring methods as indicated:
   1. Wire: install all wire in raceway.
   2. Metal Clad Cable, Type MC: where wiring concealed in gypsum wall partitions, ceilings, for connections from raceway outlet boxes to lighting fixtures, unless otherwise noted.
   3. Nonmetallic-Sheathed Cable: Type NMC concealed behind finshed walls and ceilings provided acceptable to AHJ.

3.2 INSTALLATION OF WIRES AND CABLES

A. General: Install electrical cables, wires, and connectors in compliance with MEC.

B. Coordinate cable installation with other Work.

C. Pull conductors simultaneously where more than one is being installed in same raceway. Use UL listed pulling compound or lubricant, where necessary.

D. Use pulling means including, fish tape, cable, rope, and basket weave wire/cable grips which will not damage cables or raceways. Do not use rope hitches for pulling attachment to wire or cable.

E. Conceal all cable in finished spaces.

F. Keep conductor splices to minimum.

G. Install splice and tap connectors which possess equivalent or better mechanical strength and insulation rating than conductors being spliced.

H. Use splice and tap connectors which are compatible with conductor material.

I. Provide adequate length of conductors within electrical enclosures and train the conductors to terminal points with no excess. Bundle multiple conductors, with conductors larger than no 10 AWG cabled in individual circuits. Make terminations so there is no bare conductor at the terminal.

J. Tighten electrical connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values. Where manufacturer's

torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A and UL 486B.

3.3 FIELD QUALITY CONTROL

A. Prior to energizing, check installed wires and cables with megohm meter to determine insulation resistance levels to assure requirements are fulfilled.

B. Prior to energizing, test wires and cables for electrical continuity and for short-circuits.

C. Subsequent to wire and cable hook-ups, energize circuits and demonstrate proper functioning. Correct malfunctioning units, and retest to demonstrate compliance.

D. TABLE 1: Color Coding for Phase Identification:

1. Color code secondary service, feeder, and branch circuit conductors with factory applied color as follows:

120/240Volts	Phase	208Y/120Volts
Black	A	Black
Red	B	Red
	C	Blue
White	Neutral	White
Green	Ground	Green

END OF SECTION 16120

SECTION 16135

CABINETS, BOXES, AND FITTINGS

FILED SUB-BID

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

B. Requirements specified in other Division 16 Sections apply to this section.

1.2 SUMMARY

A. This section includes cabinets, boxes, and fittings for electrical installations and certain types of electrical fittings not covered in other sections. Types of products specified in this Section include:
   1. Outlet and device boxes.
   2. Pull and junction boxes.
   3. Cabinets.
   4. Hinged door enclosures.

B. Conduit-body-type electrical enclosures and wiring fittings are specified in Division 16 Section "Raceways."

1.3 DEFINITIONS

A. Cabinets: An enclosure designed either for surface or for flush mounting and having a frame, or trim in which a door or doors may be mounted.

B. Device Box: An outlet box designed to house a receptacle device or a wiring box designed to house a switch.

C. Enclosure: A box, case, cabinet, or housing for electrical wiring or components.

D. Outlet Box: A wiring enclosure where current is taken from a wiring system to supply utilization equipment.

E. Wiring Box: An enclosure designed to provide access to wiring systems or for the mounting of indicating devices or of switches for controlling electrical circuits.

1.4 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections:

1. Product data for cabinets and enclosures with classification higher than NEMA 1.
2. Shop drawings for boxes, enclosures and cabinets that are to be shop fabricated, (nonstock items). For shop fabricated junction and pull boxes, show accurately scaled views and spatial relationships to adjacent equipment. Show box types, dimensions, and finishes.

1.5 QUALITY ASSURANCE

A. UL Listing and Labeling: Items provided under this section shall be listed and labeled by UL.

B. Nationally Recognized Testing Laboratory Listing and Labeling (NRTL): Items provided under this section shall be listed and labeled by a NRTL. The term "NRTL" shall be as defined in OSHA Regulation 1910.7.

C. Massachusetts Electrical Code Compliance: Components and installation shall comply with MEC " Massachusetts Electrical Code."

D. NEMA Compliance: Comply with NEMA Standard 250, "Enclosures for Electrical Equipment (1000 Volts Maximum)."

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
   1. Cabinets:
      a. Electric Panelboard, Inc.
      b. Erickson Electrical Equipment Co.
      c. Hoffman Engineering Co.
      d. Parker Electrical Mfg. Co.
      e. Spring City Electrical Mfg. Co.
      f. Square D Co.

2.2 CABINETS, BOXES, AND FITTINGS, GENERAL

A. Electrical Cabinets, Boxes, and Fittings: Of indicated types, sizes, and NEMA enclosure classes. Where not indicated, provide units of types, sizes, and classes appropriate for the use and location. Provide all items complete with covers and accessories required for the intended use. Provide gaskets for units in damp or wet locations. This applies to kitchen areas.

2.3 MATERIALS AND FINISHES

A. Sheet Steel: Flat-rolled, code-gage, galvanized steel.

B. Fasteners for General Use: Corrosion resistant screws and hardware including cadmium and zinc plated items.

C. Fasteners for Damp or Wet Locations: Stainless steel screws and hardware.

D. Cast Metal for Boxes, Enclosures, and Covers; Copper-free aluminum except as otherwise specified.

E. Exterior Finish: Gray baked enamel for items exposed in finished locations except as otherwise indicated.

F. Painted Interior Finish: Where indicated, white baked enamel.

G. Fittings for Boxes, Cabinets, and Enclosures: Conform to UL 514B. Malleable iron or zinc plated steel for conduit hubs, bushings and box connecters.

2.4 METAL OUTLET, DEVICE, AND SMALL WIRING BOXES

A. General: Conform to UL 514A, "Metallic Outlet Boxes, Electrical," and UL 514B, "Fittings for Conduit and Outlet Boxes." Boxes shall be of type, shape, size, and depth to suit each location and application.

B. Steel Boxes: Conform to NEMA OS 1, "Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports." Boxes shall be sheet steel with stamped knockouts, threaded screw holes and accessories suitable for each location including mounting brackets and straps, cable clamps, exterior rings and fixture studs.

C. Cast-Iron Boxes: Iron alloy, waterproof, with threaded raceway entries and features and accessories suitable for each location, including mounting ears, threaded screw holes for devices and closure plugs.

2.5 PULL OR JUNCTION BOXES

A. General: Comply with UL 50, "Electrical Cabinets and Boxes", for boxes over 100 cubic inches volume. Boxes shall have screwed or bolted on covers of material same as box and shall be of size and shape to suit application.

B. Steel Boxes: Sheet steel with welded seams. Where necessary to provide a rigid assembly, construct with internal structural steel bracing.

C. Hot-Dipped Galvanized Steel Boxes: Sheet steel with welded seams. Where necessary to provide a rigid assembly, construct with internal structural steel bracing. Hot-dip galvanized after fabrication. Cover shall be gasketed.

D. Stainless-Steel Boxes: Fabricate of stainless steel conforming to Type 302 of ASTM A 167, "Specification for Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet, and Strip." Where necessary to provide a rigid assembly, construct with internal structural stainless steel bracing. Cover shall be gasketed.

E. Cast-Iron Boxes: Molded of cast iron alloy with gasketed cover and integral threaded conduit entrances.

2.6 CABINETS

A. Comply with UL 50, "Electrical Cabinets and Boxes."

B. Construction: Sheet steel, NEMA 4 class except as otherwise indicated. Cabinet shall consist of a box and a front consisting of a one piece frame and a hinged door. Arrange door to close against a rabbet placed all around the inside edge of the frame, with a uniformly close fit between door and frame. Provide concealed fasteners, not over 24-inches apart, to hold fronts to cabinet boxes and provide for adjustment. Provide flush or concealed door hinges not over 24-inches apart and not over 6-inches from top and bottom of door. For flush cabinets, make the front approximately 3/4 inch larger than the box all around. For surface mounted cabinets make front same height and width as box.

C. Doors: Double doors for cabinets wider than 24-inches.

D. Locks: Combination spring catch and key lock, with all locks for cabinets of the same system keyed alike. Locks may be omitted on signal, power, and lighting cabinets located within wire closets and mechanical-electrical rooms. Locks shall be of a type to permit doors to latch closed without locking.

2.7 STEEL ENCLOSURES WITH HINGED DOORS

A. Comply with UL 50, "Cabinets and Enclosures" and NEMA ICS 6,

B. "Enclosures for Industrial Controls and Systems."

C. Construction: Sheet steel, 16 gage, minimum, with continuous welded seams. NEMA class as indicated; arranged for surface mounting.

D. Doors: Hinged directly to cabinet and removable, with approximately 3/4-inch flange around all edges, shaped to cover edge of box. Provide handle operated, key locking latch. Individual door width shall be no greater than 24-inches. Provide multiple doors where required.

E. Mounting Panel: Provide painted removable internal mounting panel for component installation.

F. Enclosure: NEMA 4 except as indicated. Where door gasketing is required, provide neoprene gasket attached with oil-resistant adhesive, and held in place with steel retaining strips. For all enclosures of class higher than NEMA 1, use hubbed raceway entrances.

PART 3 EXECUTION

3.1 INSTALLATION, GENERAL

A. Locations: Install items where indicated and where required to suit code requirements and installation conditions.

B. Cap unused knockout holes where blanks have been removed and plug unused conduit hubs.

C. Support and fasten items securely in accordance with Division 16 Section "Supporting Devices."

D. Sizes shall be adequate to meet MEC volume requirements, but in no case smaller than sizes indicated.

E. Remove sharp edges where they may come in contact with wiring or personnel.

3.2 APPLICATIONS

A. Cabinets: Flush mounted, NEMA enclosure Type 1 except as otherwise indicated.

B. Hinged Door Enclosures: NEMA Type 1 enclosure except as indicated.

C. Hinged Door Enclosures Outdoors: Install drip hood, factory tailored to individual units.

D. Outlet Boxes and Fittings: Install outlet and device boxes and associated covers and fittings of materials and NEMA types suitable for each location and in conformance with the following requirements:
   1. Interior Dry Locations: NEMA Type 1, sheet steel or as permitted by local code.
   2. Locations Exposed to Weather, Dampness, or Wet Locations: NEMA Type 3R enclosures.

E. Pull and Junction Boxes: Install pull and junction boxes of materials and NEMA types suitable for each location except as otherwise indicated.

3.3 INSTALLATION OF OUTLET BOXES

A. Outlets at Windows and Doors: Locate close to window trim.

B. Column and Pilaster Locations: Locate outlet boxes for switches and receptacles on columns or pilasters so the centers of the columns are clear for future installation of partitions.

C. Locations in Special Finish Materials: For outlet boxes for receptacles and switches mounted in desks or furniture cabinets or in glazed tile, concrete block, marble, brick, stone or wood walls, use rectangular shaped boxes with square corners and straight

sides. Install such boxes without plaster rings. Saw cut all recesses for outlet boxes in exposed masonry walls.

D. Gasketed Boxes: At the following locations use cast metal, threaded hub type boxes with gasketed weatherproof covers:
   1. Exterior locations.
   2. Where surface mounted on unfinished walls, columns or pilasters. (Cover gaskets may be omitted in dry locations).
   3. Where exposed to moisture laden atmosphere.
   4. Where indicated.
   5. Kitchen Area.

E. Cast-Iron Boxes: Iron alloy, waterproof, with threaded raceway entries and features and accessories suitable for each location, including mounting ears, threaded screw holes for devices and closure plugs.

F. Mounting: Mount outlet boxes for switches with the long axis vertical or as indicated. Mount boxes for receptacles either vertically or horizontally but consistently either way. Three or more gang boxes shall be mounted with the long axis horizontal. Locate box covers or device plates so they will not span different types of building finishes either vertically or horizontally. Locate boxes for switches near doors on the side opposite the hinges and close to door trim, even though electrical floor plans may show them on hinge side.

G. Ceiling Outlets: For fixtures, where wiring is concealed, use outlet boxes 4-inches square by 1-1/2-inches deep, minimum.

H. Cover Plates for Surface Boxes: Use plates sized to box front without overlap.

I. Protect outlet boxes to prevent entrance of plaster, and debris. Thoroughly clean foreign material from boxes before conductors are installed.

3.4 INSTALLATION OF PULL OR JUNCTION BOXES

A. Box Selection: For boxes in main feeder conduit runs, use sizes not smaller than 8-inches square by 4-inches deep. Do not exceed 6 entering and 6 leaving raceways in a single box. Quantities of conductors (including equipment grounding conductors) in pull or junction box shall not exceed the following:

Size of Largest Conductors in Box	Maximum no. of Conductors in Box
No. 4/0 AWG	30
250 MCM	20
500 MCM	15

Over 500 MCM 10

1. Cable Supports: Install clamps, grids, or devices to which cables may be secured. Arrange cables so they may be readily identified. Support cable at least every 30-inches inside boxes.
2. Mount pull boxes in inaccessible ceilings with the covers flush with the finished ceiling.
3. Size: Provide pull and junction boxes for telephone, signal, and other systems at least 50 percent larger than would be required by Article 370 of MEC, or as indicated. Locate boxes strategically and provide shapes to permit easy pulling of future wires or cables of types normal for such systems.

3.5 INSTALLATION OF CABINETS AND HINGED DOOR ENCLOSURES

A. Mount with fronts straight and plumb.

B. Install with tops 78-inches above floor.

C. Set cabinets in finished spaces flush with walls.

3.6 GROUNDING

A. Electrically ground metallic cabinets, boxes, and enclosures. Where wiring to item includes a grounding conductor, provide a grounding terminal in the interior of the cabinet, box or enclosure.

3.7 CLEANING AND FINISH REPAIR

A. Upon completion of installation, inspect components. Remove burrs, dirt, and construction debris and repair damaged finish including chips, scratches, abrasions and weld marks.

B. Galvanized Finish: Repair damage using a zinc-rich paint recommended by the tray manufacturer.

C. Painted Finish: Repair damage using matching corrosion inhibiting touch-up coating.

END OF SECTION 16135

SECTION 16143

WIRING DEVICES

FILED SUB-BID

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Requirements of the following Division 16 Sections apply to this section:
   1. Basic Electrical Requirements.

1.2 SUMMARY

A. This Section includes the following:
   1. Receptacles
   2. Ground Fault Circuit Interrupter Receptacles
   3. Snap Switches
   4. Wall Plates

B. Related Sections: The following sections contain requirements that relate to this section:
   1. Division 16 Section "Circuit and Motor Disconnects" for devices other than snap switches and plug/receptacle sets used as disconnects for motors.

1.3 SUBMITTALS

A. Product data for each type of product specified.

B. Samples of those products indicated for sample submission in Architect's comments on product data submittal. Include color and finish samples of device plates and other items per Architect's request.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with provisions of the following codes.

B. MEC "Massachusetts Electrical Code".
   1. UL and NEMA Compliance: Provide wiring devices which are listed and labeled by UL and comply with applicable UL and NEMA standards.

1.5 SEQUENCE AND SCHEDULING

A. Schedule installation of finish plates after the surface upon which they are installed has received final finish.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to specifications and 'Buy American' ARRA compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
   1. Cooper Wiring Devices
   2. Hubbell Inc.
   3. Leviton
   4. Pass and Seymour Inc.

2.2 WIRING DEVICES:

A. General: Provide wiring devices, in types, characteristics, grades, colors, and electrical ratings for applications indicated which are UL listed and which comply with NEMA WD 1 and other applicable UL and NEMA standards. Provide ivory color devices and wall plates except as otherwise indicated. Verify color selections with Architect.

B. Receptacles: As scheduled in Table 1 in Part 3 below. Comply with UL 498 and NEMA WD 1.

C. Ground-Fault Interrupter (GFI) Receptacles: as indicated in Table 1 in Part 3 below; provide "feed-thru" type ground-fault circuit interrupter, with integral heavy-duty NEMA 5-20R duplex receptacles arranged to protect connected downstream receptacles on same circuit. Provide unit designed for installation in a 2-3/4 inch deep outlet box without adapter, grounding type, Class A, Group 1, per UL Standard 94.3.

D. Snap Switches: quiet type AC switches as indicated in Table 2 in Part 3 below. Comply with UL 20 and NEMA WD1.

2.3 WIRING DEVICE ACCESSORIES

A. Wall plates: single and combination, of types, sizes, and with ganging and cutouts as indicated. Provide plates which mate and match with wiring devices to which attached. Provide metal screws for securing plates to devices with screw heads colored to match finish of plates. Provide wall plate color to match wiring devices except as otherwise indicated. Provide plates possessing the following additional construction features:
   1. Material and Finish: steel plate, galvanized, for building mechanical spaces.
   2. Material and Finish: plastic, smooth, for tenant spaces, and other finished areas.

PART 3 - EXECUTION

3.1 INSTALLATION OF WIRING DEVICES AND ACCESSORIES:

A. Install wiring devices and accessories as indicated, in accordance with manufacturer's written instructions, applicable requirements of MEC and in accordance with recognized industry practices to fulfill project requirements.

B. Coordinate with other Work, including painting, electrical boxes and wiring installations, as necessary to interface installation of wiring devices with other Work.

C. Install wiring devices only in electrical boxes which are clean; free from building materials, dirt, and debris.

D. Install galvanized steel wallplates in unfinished spaces.

E. Install wiring devices after wiring work is completed.

F. Install wall plates after painting work is completed.

G. Install telephone/cable tv and power service connections in accordance with final furnishings arrangement plan, plumb, true, and secure.

H. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for wiring devices. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standard 486. Use properly scaled torque indicating hand tool.

3.2 PROTECTION

A. Protect installed components from damage. Replace damaged items prior to final acceptance.

3.3 FIELD QUALITY CONTROL

A. Testing: Prior to energizing circuits, test wiring for electrical continuity, and for short-circuits. Ensure proper polarity of connections is maintained. Subsequent to energizing, test wiring devices and demonstrate compliance with requirements, operating each operable device at least six times.

B. Test ground fault interruptor operation with both local and remote fault simulations in accordance with manufacturer recommendations.

C. TABLE 1

RECEPTACLES

DESIG-NATION (1)	CURRENT RATING AMPS	VOLTAGE RATING	SINGLE/ DUPLEX	NEMA CONFIG-URATION	UL GRADE	NOTES
-	20	125	DUPLEX	5-20R	SPECIFICATION GRADE	
WP	20	125	DUPLEX	5-20R	SPECIFICATION GRADE	WEATHER-PROOF
GFCI	20	125	DUPLEX	5-20R	SPECIFICATION GRADE	INTEGRAL GFCI

NOTES
(1) Letter designations are used where symbols alone do not clearly designate on plans locations where specific receptacle types are used.

D. TABLE 2

SNAP SWITCHES

DESIG-NATION (1)	TYPICAL APPLICATION	VOLTAGE LOAD RATING	RATING (AC)	POLES	UL GRADE	NOTES
S	CONTROL LIGHTS	20A	120/277	1	HEAVY DUTY	-
S3	CONTROL - LIGHTS	20A	120/277	3-way	HEAVY DUTY	
S	DISCONN. MOTOR	1HP	120/277	1	HEAVY DUTY	(2)
STOL	DISCONN. MOTOR	2HP	208/480	3	HEAVY DUTY	(2)

NOTES
(1) For snap switches, designation is the same as the symbol used on plans for the device. Type of switch is determined from plan context including type of device or circuit being controlled.
(2) With overload element in switch.

END OF SECTION 16143

SECTION 16170

CIRCUIT AND MOTOR DISCONNECTS

FILED SUB-BID

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Requirements specified in other Division 16 Sections apply to this section.

1.2 SUMMARY

A. This Section includes circuit and motor disconnects.

B. Related Sections: The following sections contain requirements that relate to this section:
   1. Division 16 Section "Wiring Devices" for snap switches used as motor disconnects.

1.3 SUBMITTALS

A. Product data for each type of product specified.

B. Maintenance data for circuit and motor disconnects, for inclusion in Operation and Maintenance Manual specified in Division 1 and Division 16 Section "Basic Electrical Requirements."

1.4 QUALITY ASSURANCE

A. Electrical Component Standards: Provide components complying with MEC "Massachusetts Electrical Code" and which are listed and labeled by UL. Comply with UL Standard 98 and NEMA Standard KS 1.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
   1. Appleton
   2. Crouse-Hinds Co.
   3. Eaton Corp.
   4. General Electric Co.
   5. Square D Company.

2.2 CIRCUIT AND MOTOR DISCONNECT SWITCHES

A. General: Provide circuit and motor disconnect switches in types, sizes, duties, features ratings, and enclosures as indicated. Provide NEMA 1 enclosure except for outdoor switches, and other indicated locations provide NEMA 3R enclosures with raintight hubs. For motor and motor starter disconnects, provide units with horsepower ratings suitable to the loads.

B. Fusible Switches: Heavy duty switches, with fuses of classes and current ratings indicated. Where current limiting fuses are indicated, provide switches with non-interchangeable feature suitable only for current limiting type fuses.

C. Non-fusible Disconnects: Heavy duty switches of classes and current ratings as indicated.

D. Double-Throw Switches: Heavy duty switches of classes and current ratings as indicated.

E. Provide weatherproof, NEMA Type 3R rated enclousres at exterior locations.

2.3 ACCESSORIES

A. Electrical Interlocks: Provide number and arrangement of interlock contacts in switches as indicated.

B. Captive Fuse Pullers: Provide built-in fuse pullers arranged to facilitate fuse removal.

PART 3 - EXECUTION

3.1 INSTALLATION OF CIRCUITS AND MOTOR DISCONNECTS

A. General: Provide circuit and motor disconnect switches as indicated and where required by the above Code. Comply with switch manufacturers' printed installation instructions.

3.2 FIELD QUALITY CONTROL

A. Testing: Subsequent to completion of installation of electrical disconnect switches, energize circuits and demonstrate capability and compliance with requirements. Except as otherwise indicated, do not test switches by operating them under load. However, demonstrate switch operation through six opening/closing cycles with circuit unloaded. Open each switch enclosure for inspection of interior, mechanical and electrical connections, fuse installation, and for verification of type and rating of fuses installed. Correct deficiencies then retest to demonstrate compliance. Remove and replace defective units with new units and retest.

END OF SECTION 16170

SECTION 16190

SUPPORTING DEVICES

FILED SUB-BID

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

B. Requirements specified in other Division 16 Sections apply to this section.

1.2 SUMMARY

A. This Section includes secure support from the building structure for electrical items by means of hangers, supports, anchors, sleeves, inserts, seals, and associated fastenings.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for each type of product specified.
   1. Hanger and support schedule showing manufacturer's figure number, size, spacing, features, and application for each required type of hanger, support, sleeve, seal, and fastener to be used.

C. Shop drawings indicating details of fabricated products and materials.

D. Engineered Design consisting of details and engineering analysis for supports for the following items:
   1. Fastener supporting systems.

1.4 QUALITY ASSURANCE

A. Electrical Component Standard: Components and installation shall comply with MEC "Massachusetts Electrical Code."

B. Electrical components shall be listed and labeled by UL, ETL, CSA, or other approved, nationally recognized testing and listing agency that provides third-party certification follow-up services.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
   1. Slotted Metal Angle and U-Channel Systems:
      a. Allied Tube & Conduit
      b. B-Line Systems, Inc.
      c. GS Metals Corp.
      d. Unistrut Diversified Products
   2. Conduit Sealing Bushings:
      a. Bridgeport Fittings, Inc.
      b. Cooper Industries, Inc.
      c. O-Z/Gedney
      d. Producto Electric Corp.
      e. Raco, Inc.
      f. Spring City Electrical Mgf. Co.
      g. Thomas & Betts Corp.

2.2 COATINGS

A. Coating: Supports, support hardware, and fasteners shall be protected with zinc coating or with treatment of equivalent corrosion resistance using approved alternative treatment, finish, or inherent material characteristic. Products for use outdoors shall be hot-dip galvanized.

2.3 MANUFACTURED SUPPORTING DEVICES

A. Raceway Supports: Clevis hangers, riser clamps, conduit straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring steel clamps.

B. Fasteners: Types, materials, and construction features as follows:
   1. Expansion Anchors: Carbon steel wedge or sleeve type.
   2. Toggle Bolts: All steel springhead type.

C. Conduit Sealing Bushings: Factory-fabricated watertight conduit sealing bushing assemblies suitable for sealing around conduit, or tubing passing through concrete floors and walls. Construct seals with steel sleeve, malleable iron body, neoprene sealing grommets or rings, metal pressure rings, pressure clamps, and cap screws.

D. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for nonarmored electrical cables in riser conduits. Provide plugs with number and size of conductor gripping holes as required to suit individual risers. Construct body of malleable-iron casting with hot-dip galvanized finish.

E. U-Channel Systems: 16-gage steel channels, with 9/16-inch-diameter holes, at a minimum of 8 inches on center, in top surface. Provide fittings and accessories that mate and match with U-channel and are of the same manufacture.

2.4 FABRICATED SUPPORTING DEVICES

A. General: Shop- or field-fabricated supports or manufactured supports assembled from U-channel components.

B. Steel Brackets: Fabricated of angles, channels, and other standard structural shapes. Connect with welds and machine bolts to form rigid supports.

C. Pipe Sleeves: Provide pipe sleeves of one of the following:

1. Sheet Metal: Fabricate from galvanized sheet metal; round tube closed with snaplock joint, welded spiral seams, or welded longitudinal joint. Fabricate sleeves from the following gage metal for sleeve diameter noted:
   a. 3-inch and smaller: 20-gage.
   b. 4-inch to 6-inch: 16-gage.
   c. over 6-inch: 14-gage.

2. Steel Pipe: Fabricate from Schedule 40 galvanized steel pipe.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install supporting devices to fasten electrical components securely and permanently in accordance with MEC requirements.

B. Coordinate with the building structural system and with other electrical installation.

C. Raceway Supports: Comply with the MEC and the following requirements:

1. Conform to manufacturer's recommendations for selection and installation of supports.
2. Strength of each support shall be adequate to carry present and future load multiplied by a safety factor of at least four. Where this determination results in a safety allowance of less than 200 lbs, provide additional strength until there is a minimum of 200 lbs safety allowance in the strength of each support.
3. Install individual and multiple (trapeze) raceway hangers and riser clamps as necessary to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assembly and for securing hanger rods and conduits.
4. Support parallel runs of horizontal raceways together on trapeze-type hangers.
5. Support individual horizontal raceways by separate pipe hangers. Spring steel fasteners may be used in lieu of hangers only for 1-1/2-inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings only. For hanger rods with spring steel fasteners, use 1/4-inch-diameter or larger threaded steel. Use spring steel fasteners that are specifically designed for supporting single conduits or tubing.

6. Space supports for raceways in accordance with Table I of this section. Space supports for raceway types not covered by the above in accordance with MEC.
7. Support exposed and concealed raceway within 1 foot of an unsupported box and access fittings. In horizontal runs, support at the box and access fittings may be omitted where box or access fittings are independently supported and raceway terminals are not made with chase nipples or threadless box connectors.
8. In vertical runs, arrange support so the load produced by the weight of the raceway and the enclosed conductors is carried entirely by the conduit supports with no weight load on raceway terminals.

D. Vertical Conductor Supports: Install simultaneously with installation of conductors.

E. Miscellaneous Supports: Support miscellaneous electrical components as required to produce the same structural safety factors as specified for raceway supports. Install metal channel racks for mounting cabinets, panelboards, disconnects, control enclosures, pull boxes, junction boxes, transformers, and other devices.

F. In open overhead spaces, cast boxes threaded to raceways need not be supported separately except where used for fixture support; support sheet metal boxes directly from the building structure or by bar hangers. Where bar hangers are used, attach the bar to raceways on opposite sides of the box and support the raceway with an approved type of fastener not more than 24 inches from the box.

G. Sleeves: Install in concrete slabs and walls and all other fire-rated floors and walls for raceways and cable installations. For sleeves through fire rated-wall or floor construction, apply UL- listed firestopping sealant in gaps between sleeves and enclosed conduits and cables in accordance with requirements specified elsewhere.

H. Conduit Seals: Install seals for conduit penetrations of slabs on grade and exterior walls below grade and where indicated. Tighten sleeve seal screws until sealing grommets have expanded to form watertight seal.

I. Fastening: Unless otherwise indicated, fasten electrical items and their supporting hardware securely to the building structure, including but not limited to conduits, raceways, cables, cable trays, busways, cabinets, panelboards, transformers, boxes, disconnect switches, and control components in accordance with the following:
1. Fasten by means of wood screws or screw-type nails on wood, toggle bolts on hollow masonry units, concrete inserts or expansion bolts on concrete or solid masonry, and machine screws, welded threaded studs, or spring-tension clamps on steel. Do not weld conduit, pipe straps, or items other than threaded studs to steel structures. In partitions of light steel construction, use sheet metal screws.
2. Holes cut to depth of more than 1-1/2 inches in reinforced concrete beams or to depth of more than 3/4 inch in concrete shall not cut the main reinforcing bars. Fill holes that are not used.

3. Ensure that the load applied to any fastener does not exceed 25 percent of the proof test load. Use vibration- and shock- resistant fasteners for attachments to concrete slabs.

J. TESTS: Test pull-out resistance of one of each type, size, and anchorage material for the following fastener types:
1. Expansion anchors.
2. Toggle bolts.

K. Provide all jacks, jigs, fixtures, and calibrated indicating scales required for reliable testing. Obtain the structural Engineer's approval before transmitting loads to the structure. Test to 90 percent of rated proof load for fastener. If fastening fails test, revise all similar fastener installations and retest until satisfactory results are achieved.

L. Conduit seals at walk-in cooler& freezer location: Install seals for conduit penetrations into cooler or freezer equipment where conduit enters the repsective conditional areas, and at slab locations.

3.2 TABLE I: SPACING FOR RACEWAY SUPPORTS

HORIZONTAL RUNS

Raceway Size (Inches)	No. of Conductors in Run	Location	RMC & IMC (1)	EMT (1)
1/2,3/4	1 or 2	Flat ceiling or wall.	5	5
1/2,3/4	1 or 2	Where it is difficult to provide supports except at intervals fixed by the building construction.	7	7
1/2,3/4	3 or more	Any location.	7	7
1/2-1	3 or more	Any location.		
1 & larger	1 or 2	Flat ceiling or wall.	6	6
1 & larger	1 or 2	Where it is difficult to provide supports except at intervals fixed by the building construction.	10	10
1 & larger	3 or more	Any location.	10	10
Any	....	Concealed.	10	10

VERTICAL RUNS

Raceway Size (Inches)	No. of Conductors in Run	Location	RMC & IMC (1,2)	EMT (1)
1/2,3/4	....	Exposed.	7	7
1,1-1/4	....	Exposed.	8	8
1-1/2 and larger	....	Exposed.	10	10
Up to 2	....	Shaftway.	14	10
2-1/2	....	Shaftway.	16	10
3 & larger	....	Shaftway.	20	10
Any	....	Concealed.	10	10

NOTES:

(1) Maximum spacing of supports (feet).
(2) Maximum spacings for IMC above apply to straight runs only. Otherwise the maximums for EMT apply.

Abbreviations: EMT Electrical metallic tubing.
IMC Intermediate metallic conduit.
RMC Rigid metallic conduit.

END OF SECTION 16190

SECTION 16195

ELECTRICAL IDENTIFICATION

FILED SUB-BID

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

B. Requirements specified in other Division 16 Sections apply to this section.

1.2 SUMMARY

A. This Section includes identification of electrical materials, equipment, and installations. It includes requirements for electrical identification components including but not limited to the following:
   1. Identification labeling for switchboards, panelboards, devices, raceways, cables, and conductors.
   2. Operational instruction signs.
   3. Warning and caution signs.
   4. Equipment labels and signs.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Division 16 Section "Wires and Cables" for requirements for color coding of conductors for phase identification.

C. Refer to other Division 16 sections for additional specific electrical identification associated with specific items.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product Data for each type of product specified.

C. Schedule of identification nomenclature to be used for identification signs and labels.

D. Samples of each color, lettering style, and other graphic representation required for identification materials; samples of labels and signs.

1.4 QUALITY ASSURANCE

A. Electrical Component Standard: Components and installation shall comply with MEC "Massachusetts Electrical Code."

B. ANSI Compliance: Comply with requirements of ANSI Standard A13.1, "Scheme for the Identification of Piping Systems," with regard to type and size of lettering for raceway and cable labels.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
   1. American Labelmark Co.
   2. Ideal Industries, Inc.
   3. LEM Products, Inc.
   4. Markal Corp.
   5. National Band and Tag Co.
   6. Panduit Corp.
   7. Seton Name Plate Co.

2.2 ELECTRICAL IDENTIFICATION PRODUCTS

A. Adhesive Marking Labels for Raceway and Cable: Pre-printed, flexible, self-adhesive labels with legend indicating voltage and service (Emergency, Lighting, Power, Light, Air Conditioning, Communications, Control, Fire, etc.).

B. Label Size: as follows:
   1. Raceways 1-Inch and Smaller: 1-1/8 inches high by 4 inches long.
   2. Raceways Larger than 1-Inch: 1-1/8 inches high by 8 inches long.

C. Color: Black legend on orange background.

D. Colored Adhesive Marking Tape for Raceways, Wires, and Cables: Self-adhesive vinyl tape not less than 3 mils thick by 1 inch to 2 inches in width.

E. Pretensioned Flexible Wraparound Colored Plastic Sleeves for Raceway and Cable Identification: Flexible acrylic bands sized to suit the raceway diameter and arranged to stay in place by pre- tensioned gripping action when coiled around the raceway or cable.

F. Wire/Cable Designation Tape Markers: Vinyl or vinyl-cloth, self- adhesive, wraparound, cable/conductor markers with preprinted numbers and letter.

G. Plasticized Card Stock Tags: Vinyl cloth with preprinted and field-printed legends to suit the application. Orange background, except as otherwise indicated, with Eyelet for fastener.

H. Engraved, Plastic-Laminated Labels, Signs, and Instruction Plates: Engraving stock melamine plastic laminate, 1/16-inch minimum thick for signs up to 20 square inches, or 8 inches in length; 1/8-inch thick for larger sizes. Engraved legend in white letters on black face and punched for mechanical fasteners.

I. Baked-Enamel Warning and Caution Signs for Interior Use: Preprinted aluminum signs, punched for fasteners, with colors, legend, and size appropriate to the location.

J. Exterior Metal-Backed Butyrate Warning and Caution Signs: Weather-resistant, nonfading, preprinted cellulose acetate butyrate signs with 20-gage, galvanized steel backing, with colors, legend, and size appropriate to the location. Provide 1/4-inch grommets in corners for mounting.

K. Fasteners for Plastic-Laminated and Metal Signs: Self-tapping stainless steel screws or number 10/32 stainless steel machine screws with nuts and flat and lock washers.

L. Cable Ties: Fungus-inert, self-extinguishing, one-piece, self-locking nylon cable ties, 0.18-inch minimum width, 50-lb minimum tensile strength, and suitable for a temperature range from minus 50 deg F to 350 deg F. Provide ties in specified colors when used for color coding.

PART 3 EXECUTION

3.1 INSTALLATION

A. Lettering and Graphics: Coordinate names, abbreviations, colors, and other designations used in electrical identification work with corresponding designations specified or indicated. Install numbers, lettering, and colors as approved in submittals and as required by code.

B. Install identification devices in accordance with manufacturer's written instructions and requirements of MEC.

C. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish work.

D. Conduit Identification:

1. The following areas shall be identified:
   a. On wall surfaces directly external to conduits run concealed within wall.
   b. On all accessible surfaces of concrete envelope around conduits in vertical shafts, exposed at ceilings or concealed above suspended ceilings.

2. Apply identification to areas as follows:

   a. Clean surface of dust, loose material, and oily films before painting.

b. Prime surfaces: For galvanized metal, use single-component acrylic vehicle coating formulated for galvanized surfaces. For concrete masonry units, use heavy-duty acrylic resin block filler. For concrete surfaces, use clear alkali-resistant alkyd binder-type sealer.
c. Apply one intermediate and one finish coat of orange silicone alkyd enamel.
d. Apply primer and finish materials in accordance with manufacturer's instructions.

E. Identify Raceways of Certain Systems with Color Banding: Band exposed or accessible raceways of the following systems for identification. Bands shall be pretensioned, snap-around colored plastic sleeves, colored adhesive marking tape, or a combination of the two. Make each color band 2 inches wide, completely encircling conduit, and place adjacent bands of two-color markings in contact, side by side. Install bands at changes in direction, at penetrations of walls and floors, and at 40-foot maximum intervals in straight runs. Apply the following colors:
1. Fire Alarm System: Red
2. Fire Suppression Supervisory and Control System: Red
3. Mechanical and Electrical Supervisory System: Green and Blue
4. Telephone System: Green and Yellow

F. Identify Junction, Pull, and Connection Boxes: Code-required caution sign for boxes shall be pressure-sensitive, self-adhesive label indicating system voltage in black, preprinted on orange background. Install on outside of box cover. Also label box covers with identity of contained circuits. Use pressure- sensitive plastic labels at exposed locations and similar labels or plasticized card stock tags at concealed boxes.

G. Conductor Color Coding: Provide color coding for secondary service, feeder, and branch circuit conductors throughout the project secondary electrical system as follows:

208Y/120 Volts	Phase
Black	A
Red	B
Blue	C
White	Neutral
Green	Ground

H. Use conductors with color factory-applied the entire length of the conductors except as follows:

1. The following field-applied color-coding methods may be used in lieu of factory-coded wire for sizes larger than No. 10 AWG.
a. Apply colored, pressure-sensitive plastic tape in half- lapped turns for a distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply the last two laps of tape with no tension to prevent possible

unwinding. Use 1-inch-wide tape in colors as specified. Do not obliterate cable identification markings by taping. Tape locations may be adjusted slightly to prevent such obliteration.

b. In lieu of pressure-sensitive tape, colored cable ties may be used for color identification. Apply three ties of specified color to each wire at each terminal or splice point starting 3 inches from the terminal and spaced 3 inches apart. Apply with a special tool or pliers, tighten for snug fit, and cut off excess length.

I. Tag or label conductors as follows:

1. Future Connections: Conductors indicated to be for future connection or connection under another contract with identification indicating source and circuit numbers.
2. Multiple Circuits: Where multiple branch circuits or control wiring or signal conductors are present in the same box or enclosure (except for three-circuit, four-wire home runs), label each conductor or cable. Provide legend indicating source, voltage, circuit number, and phase for branch circuit wiring. Phase and voltage of branch circuit wiring may be indicated by mean of coded color of conductor insulation. For control and signal wiring, use color coding or wire marking tape at terminations and at intermediate locations where conductors appear in wiring boxes, troughs, and control cabinets. Use consistent letter/number conductor designations throughout on wire marking tapes.
3. Match identification markings with designations used in panelboards shop drawings, Contract Documents, and similar previously established identification schemes for the facility's electrical installations.

J. Apply warning, caution, and instruction signs and stencils as follows:

1. Install warning, caution, or instruction signs where required by MEC, where indicated, or where reasonably required to assure safe operation and maintenance of electrical systems and of the items to which they connect. Install engraved plastic- laminated instruction signs with approved legend where instructions or explanations are needed for system or equipment operation. Install butyrate signs with metal backing for outdoor items.

K. Install equipment identification as follows:

1. Apply equipment identification labels of engraved plastic- laminate on each major unit of electrical equipment in building, including central or master unit of each electrical system. This includes alarm systems, unless unit is specified with its own self-explanatory identification. Except as otherwise indicated, provide single line of text, with 1/2-inch-high lettering on 1-1/2-inch-high label (2-inch-high where two lines are required), white lettering in black field. Text shall match terminology and numbering of the Contract Documents and shop drawings. Apply labels for each unit of the following categories of electrical equipment.
   a. Panelboards, electrical cabinets, and enclosures.
   b. Access doors and panels for concealed electrical items.

c. Motor starters.
d. Contactors.
e. Control devices.
f. Transformers.

L. Apply designation labels of engraved plastic laminate for disconnect switches, breakers, pushbuttons, pilot lights, motor control centers, and similar items for power distribution and control components above, except panelboards and alarm/signal components, where labeling is specified elsewhere. For panelboards, provide framed, typed circuit schedules with explicit description and identification of items controlled by each individual breaker.

M. Install labels at locations indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment.

END OF SECTION 16195

SECTION 16452

GROUNDING

FILED SUB-BID

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes solid grounding of electrical systems and equipment. It includes basic requirements for grounding for protection of life, equipment, circuits, and systems. Grounding requirements specified in this Section may be supplemented in other sections of these Specifications.

B. Related Sections: The following sections contain requirements that relate to this Section:
   1. Division 16 Section "Wires and Cables."

1.2 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for ground rods, connectors and connection materials, and grounding fittings.

C. Field-testing organization certificate, signed by the Contractor, certifying that the organization performing field tests complies with the requirements specified in Quality Assurance below.

D. Report of field tests and observations certified by the testing organization.

1.3 QUALITY ASSURANCE

A. Listing and Labeling: Provide products specified in this Section that are listed and labeled. The terms "listed" and "labeled" shall be defined as they are in the Massachusetts Electrical Code, Article 100.
   1. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

B. Field-Testing Organization Qualifications: To qualify for acceptance, the independent testing organization must demonstrate, based on evaluation of organization-submitted criteria conforming to ASTM E 699, that it has the experience and capability to conduct satisfactorily the testing indicated.

C. Electrical Component Standard: Components and installation shall comply with MEC, "Massachusetts Electrical Code" (MEC).

D. UL Standard: Comply with UL 467, "Grounding and Bonding Equipment."

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
1. Anixter Bros., Inc.
2. Bashlin Industries, Inc.
3. Buckingham Mfg. Co.
4. A.B. Chance Co.
5. Erico Products, Inc.
6. GB Electrical, Inc.
7. Ideal Industries, Inc.
8. O-Z/Gedney Co.
9. Raco, Inc.
10. Thomas & Betts Corp.
12. W.H. Salisbury & Co.
13. Utilco Co.

2.2 GROUNDING AND BONDING PRODUCTS

A. Products: Of types indicated and of sizes and ratings to comply with MEC. Where types, sizes, ratings, and quantities indicated are in excess of MEC requirements, the more stringent requirements and the greater size, rating, and quantity indications govern.

B. Conductor Materials: Copper.

2.3 WIRE AND CABLE CONDUCTORS

A. General: Comply with Division 16 Section "Wires and Cables." Conform to MEC Table
8, except as otherwise indicated, for conductor properties, including stranding.

B. Equipment Grounding Conductor: Green insulated.

C. Grounding Electrode Conductor: Stranded cable.

D. Bare Copper Conductors: Conform to the following:
1. Assembly of Stranded Conductors: ASTM B-8.

2.4 MISCELLANEOUS CONDUCTORS

A. Ground Bus: Bare annealed copper bars of rectangular cross section.

B. Braided Bonding Jumpers: Copper tape, braided No. 30 gage bare copper wire, terminated with copper ferrules.

C. Bonding Strap Conductor/Connectors: Soft copper, 0.05 inch thick and 2 inches wide, except as indicated.

2.5 CONNECTOR PRODUCTS

A. General: Listed and labeled as grounding connectors for the materials used.

B. Pressure Connectors: High-conductivity-plated units.

C. Bolted Clamps: Heavy-duty units listed for the application.

D. Exothermic Welded Connections: Provided in kit form and selected for the specific types, sizes, and combinations of conductors and other items to be connected.

E. Aluminum-To-Copper Connections: Bimetallic type, conforming to UL 96, "Lighting Protection Components," or UL 467.

PART 3 EXECUTION

3.1 APPLICATIONS

A. Equipment Grounding Conductor Application: Comply with MEC Article 250 for sizes and quantities of equipment grounding conductors, except where larger sizes or more conductors are indicated.

1. Install separate insulated equipment grounding conductors with circuit conductors for the following in addition to those locations where required by Code:
   a. Lighting circuits.
   b. Feeders and branch circuits.
   c. Receptacle Circuits.
   d. Single-phase motor or appliance circuits.
   e. Three-phase motor or appliance branch circuits.

3.2 INSTALLATION

A. General: Ground electrical systems and equipment in accordance with MEC requirements except where the Drawings or Specifications exceed MEC requirements.

B. Braided-Type Bonding Jumpers: Install to connect ground clamps on water meter piping to bypass water meters electrically. Use elsewhere for flexible bonding and grounding connections.

C. Route grounding conductors along the shortest and straightest paths possible without obstructing access or placing conductors where they may be subjected to strain, impact, or damage, except as indicated.

D. Bond interior metal piping systems and metal air ducts to equipment ground conductors of pumps, fans, electric heaters, and air cleaners serving individual systems.

3.3 CONNECTIONS

A. General: Make connections in such a manner as to minimize possibility of galvanic action or electrolysis. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to assure high conductivity and make contact points closer in order of galvanic series.
2. Make connections with clean bare metal at points of contact.
3. Aluminum to steel connections shall be with stainless steel separators and mechanical clamps.
4. Aluminum to galvanized steel connections shall be with tin-plated copper jumpers and mechanical clamps.
5. Coat and seal connections involving dissimilar metals with inert material such as red lead paint to prevent future penetration of moisture to contact surfaces.

B. Terminate insulated equipment grounding conductors for feeders and branch circuits with pressure-type grounding lugs. Where metallic raceways terminate at metallic housings without mechanical and electrical connection to the housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to the ground bus in the housing. Bond electrically noncontinuous conduits at both entrances and exits with grounding bushings and bare grounding conductors.

C. Tighten grounding and bonding connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values for connectors and bolts. Where manufacturer's torquing requirements are not indicated, tighten connections to comply with torque tightening values specified in UL 486A and UL 486B.

D. Compression-Type Connections: Use hydraulic compression tools to provide the correct circumferential pressure for compression connectors. Use tools and dies recommended by the manufacturer of the connectors. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on the ground conductor.

E. Moisture Protection: Where insulated ground conductors are connected to ground rods or ground buses, insulate the entire area of the connection and seal against moisture penetration of the insulation and cable.

3.4 FIELD QUALITY CONTROL

A. Independent Testing Organization: Arrange and pay for the services of a qualified independent electrical testing organization to perform tests described below.

B. Tests: Subject the completed grounding system to a megger test at each location where a maximum ground resistance level is specified, at service disconnect enclosure ground terminal, and at ground test wells. Measure ground resistance without the soil being moistened by any means other than natural precipitation or natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests by the 2-point method in accordance with Section 9.03 of IEEE 81, "Guide for Measuring Earth Resistivity, Ground Impedance and Earth Surface Potentials of a Grounding System."

C. Deficiencies: Where ground resistances exceed specified values, and if directed, modify the grounding system to reduce resistance values. Where measures are directed that exceed those indicated the provisions of the Contract, covering changes will apply.

D. Report: Prepare test reports, certified by the testing organization, of the ground resistance at each test location. Include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

END OF SECTION 16452

SECTION 16470

PANELBOARDS

FILED SUB-BID

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. All of the Contract Documents, including General and Supplementary Conditions and Division 0 - Bidding Documents, Contract Forms and Conditions of the Contract and Division 1 - General Requirements, apply to the work of this Section.

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

1.2 SUMMARY

A. This Section includes lighting and power panelboards and associated auxiliary equipment rated 600 V or less.

B. Related Sections: The following Division 16 Sections contain requirements that relate to this Section:
   1. "Overcurrent Protective Devices" for circuit breakers, and other devices used in panelboards.

1.3 DEFINITIONS

A. Overcurrent Protective Device (OCPD): A device operative on excessive current that causes and maintains the interruption of power in the circuit it protects.

1.4 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for each type panelboard, accessory item, and component specified.

C. Shop drawings from manufacturers of panelboards including dimensioned plans, sections, and elevations. Show tabulations of installed devices, major features, and voltage rating. Include the following:
   1. Enclosure type with details for types other than NEMA Type 1.
   2. Bus configuration and current ratings.
   3. Short-circuit current rating of panelboard.

4. Features, characteristics, ratings, and factory settings of individual protective devices and auxiliary components.

D. Qualification data for field-testing organization certificates, signed by the Contractor, certifying that the organization complies with the requirements specified in Quality Assurance below. Include list of completed projects with project names, addresses, and names of Architect and Owner plus basic organization qualifications data.

E. Report of field tests and observations certified by the testing organization.

F. Panel schedules for installation in panelboards. Submit final versions after load balancing.

G. Maintenance data for panelboard components, for inclusion in Operating and Maintenance Manual specified in Division 1 and in Division 16 Section "Basic Electrical Requirements." Include instructions for testing circuit breakers.

1.5 QUALITY ASSURANCE

A. Listing and Labeling: Provide products specified in this Section that are listed and labeled.
   1. The terms "listed" and "labeled" shall be defined as they are in the Massachusetts Electrical Code, Article 100.
   2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

B. Field-Testing Organization Qualifications: To qualify for acceptance, the independent testing organization must demonstrate, based on evaluation of organization-submitted criteria conforming to ASTM E 699, that it has the experience and capability to conduct satisfactorily the testing indicated.

C. Electrical Component Standard: Components and installation shall comply with MEC, "Massachusetts Electrical Code."

D. NEMA Standard: Comply with NEMA PB1, "Panelboards."

E. UL Standards: Comply with UL 61, "Panelboards," and UL 50, "Cabinets and Boxes."

1.6 EXTRA MATERIALS

A. Keys: Furnish six spares of each type for panelboard cabinet locks.

B. Touch-up Paint for surface-mounted panelboards: One half-pint container.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Eaton Corp.
2. General Electric
3. Siemens
4. Square D

2.2 PANELBOARDS, GENERAL REQUIREMENTS

A. Overcurrent Protective Devices (OCPDs): Provide type, rating, and features as indicated. Comply with Division 16 Section "Overcurrent Protective Devices," with OCPDs adapted to panelboard installation. Tandem circuit breakers shall not be used. Multipole breakers shall have common trip.

B. Enclosures: Cabinets, flush or surface mounted as indicted. NEMA Type 1 enclosure, except where the following enclosure requirements are indicated.
   1. NEMA 3R: Raintight.

C. Front: Secured to box with concealed trim clamps except as indicated. Front for surface-mounted panels shall be same dimensions as box. Fronts for flush panels shall overlap box except as otherwise specified.

D. Directory Frame: Metal, mounted inside each panel door.

E. Bus: Hard drawn copper of 98 percent conductivity.

F. Main and Neutral Lugs: Compression type.

G. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors. Ground bus to be installed in accordance with MEC and local authorities.

H. Service Equipment Approval: Listed for use as service equipment for panelboards having main service disconnect.

I. Provision for Future Devices: Equip with mounting brackets, bus connections, and necessary appurtenances, for the OCPD ampere ratings indicated for future installation of devices.

J. Special Features: Provide the following features for panelboards as indicated.
   1. Hinged Front Cover: Entire front trim hinged to box with standard door within hinged trim cover.
   2. Skirt For Surface-Mounted Panels: Same gage and finish as panel front with flanges for attachment to panel, wall, and floor.
   3. Subfeed: Lug provision as indicated.

K. Feed-Through Lugs: Sized to accommodate feeders indicated.

2.3 HOUSE CIRCUIT PANELBOARDS

A. Branch OCPDs: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

B. Doors: In panel front, with concealed hinges. Secure with flush catch and tumbler lock, all keyed alike.

2.4 MAIN DISTRIBUTION PANELBOARDS

A. Doors: Located in panel front. Secure with vault-type with tumbler lock, all keyed alike.

B. Branch-Circuit Breakers: Where OCPDs are indicated to be circuit breakers, use bolt-on breakers.

2.5 ACCESSORY COMPONENTS AND FEATURES

A. Accessory Set: Include tools and miscellaneous items as required for overcurrent protective device test, inspection, maintenance, and operation.

B. Portable Test Set: Arranged to permit testing of functions of solid-state trip devices without removal from panelboard.

C. Fungus Proofing: Permanent fungicidal treatment for panelboards interior including OCPDs and other components.

2.6 IDENTIFICATION

A. Panelboard Nameplates: Engraved laminated plastic or metal nameplate for each panelboard mounted in main electrical room with epoxy or industrial cement or industrial adhesive.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install panelboards and accessory items in accordance with NEMA PB 1.1, "General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less" and manufacturers' written installation instructions.

B. Mounting Heights: Top of trim 6'-2" above finished floor, in finshed areas, except as indicated. Coordinate with local authorities, Owner's representatives, and Architectural requirements.

C. Mounting: Plumb and rigid without distortion of box. Mount flush panels uniformly flush with wall finish.

D. Circuit Directory: Typed and reflective of final circuit changes required to balance panel loads. Obtain approval before installing.

E. Install filler plates in unused spaces.

F. Wiring in Panel Gutters: Train conductors neatly in groups, bundle, and wrap with wire ties after completion of load balancing.

3.2 GROUNDING

A. Connections: Make equipment grounding connections for panelboards as indicated.

B. Provide ground continuity to main electrical ground bus indicated.

3.3 CONNECTIONS

A. Tighten electrical connectors and terminals, including grounding connections, in accordance with manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486.

3.4 FIELD QUALITY CONTROL

A. Independent Testing Organization: Arrange and pay for the services of an independent electrical testing organization in to perform tests on low-voltage panelboards and accessories.

B. Pretesting: Upon completing installation of the system, perform the following preparations for independent tests:
   1. Make insulation resistance tests of panelboard buses, components, and connecting supply, and feeder circuits.
   2. Make continuity tests of circuits.
   3. Provide set of Contract Documents to test organization. Include full updating on final system configuration and parameters where they supplement or differ from those indicated in original Contract Documents.

C. Quality Control Program: Conform to the following:
   1. Procedures: Make field tests and inspections and prepare panelboard for satisfactory operation in accordance with manufacturer's recommendations and these specifications.
   2. Schedule tests with at least one week in advance notification.
   3. Reports by Testing Organization: Report written reports of tests and observations. Report defective materials and workmanship and unsatisfactory test results. Include records of repairs and adjustments made.
   4. Labeling: Upon satisfactory completion of tests and related effort, apply a label to tested components indicating results of tests and inspections, responsible organization and person, and date.
   5. Protective Device Ratings and Settings: Verify indicated ratings and settings to be appropriate for final system configuration and parameters. Where discrepancies are found, recommend final protective device ratings and settings. Use accepted ratings or settings to make the final system adjustments.

D. Visual and Mechanical Inspection: Include the following inspections and related work:
   1. Inspect for defects and physical damage, labeling, and nameplate compliance with

requirements of up-to-date drawings and panelboard schedules.

2. Exercise and perform of operational tests of all mechanical components and other operable devices in accordance with manufacturer's instruction manual.
3. Check panelboard mounting, area clearances, and alignment and fit of components.
4. Check tightness of bolted electrical connections with calibrated torque wrench. Refer to manufacturer's instructions for proper torque values.
5. Perform visual and mechanical inspection and related work for overcurrent protective devices as specified in Division 16 Section "Overcurrent Protective Devices."

E. Electrical tests: Include the following items performed in accordance with manufacturer's instruction:

1. Insulation resistance test of buses and portions of control wiring that disconnected from solid-state devices. Insulation resistance less than 100 megohms is not acceptable.
2. Ground resistance test on system and equipment ground connections.
3. Test main and subfeed overcurrent protective devices in accordance with Section "Overcurrent Protective Devices."

F. Retest: Correct deficiencies identified by tests and observations and provide retesting of panelboards by testing organization. Verify by the system tests that the total assembly meets specified requirements.

3.5 CLEANING

A. Upon completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots, dirt, and debris. Touch up scratches and mars of finish to match original finish.

3.6 COMMISSIONING

A. Balancing Loads: After Substantial Completion, but not more than two months after Final Acceptance, conduct load-balancing measurements and circuit changes as follows:

1. Perform measurements during period of normal working load as advised by the Owner.
2. Perform load-balancing circuit changes outside the normal occupancy/working schedule of the facility. Make special arrangements with Owner.
3. Recheck loads after circuit changes during normal load period. Record all load readings before and after changes and submit test records.
4. Tolerance: Difference between phase loads exceeding 20 percent at any one panelboard is not acceptable. Rebalance and recheck as required to meet this minimum requirement.

END OF SECTION - 16470

SECTION 16475

OVERCURRENT PROTECTIVE DEVICES

FILED SUB-BID

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes overcurrent protective devices (OCPDs) rated 600 V and below and switching devices commonly used with them.

B. Panelboards: Application, installation, and other related requirements for overcurrent protective device installations in distribution equipment are specified in other Division 16 sections.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Cartridge Fuses:
   a. Bussmann Div., Cooper Industries, Inc.
   b. Gould Inc.
   c. Littelfuse Inc.

2. Fusible Switches:
   a. Allen-Bradley Co.
   b. Crouse-Hinds Distribution Equipment.
   c. Eaton Corp.
   d. General Electric Co.
   e. Siemens
   f. Square D

3. Molded-Case Circuit Breakers:
   a. Eaton Corp.
   b. General Electric Co.
   c. Siemens
   d. Square D

2.2 OVERCURRENT PROTECTIVE DEVICES (OCPDs), GENERAL

A. General: Provide OCPDs in indicated types, as integral components of panelboards and also as individually enclosed and mounted single units.

B. General: Provide OCPDs in indicated types, as integral components of panelboards, switchboards, and motor control centers; and also as individually enclosed and mounted single units.

C. Enclosures: NEMA 250 "Enclosures for Electrical Equipment (1,000 Volts Maximum)."

2.3 CARTRIDGE FUSES

A. General: NEMA Standard FU1, "Low-Voltage Cartridge Fuses." Unless indicated otherwise, provide nonrenewable cartridge fuses of indicated types, classes, and current ratings that have voltage ratings consistent with the circuits on which used.

B. Class J Fuses: UL 198C, "High-Interrupting Capacity Fuses, Current-Limiting Type."

C. Class L Fuses: UL 198C, "High-Interrupting Capacity Fuses, Current-Limiting Type."

D. Class RK1 and RK5 Dual Element Time-Delay Fuses: UL 198E, "Class R Fuses."

E. Class RK1 Fast-Acting Fuses: UL 198E, "Class R Fuses."

2.4 FUSIBLE SWITCHES

A. General: UL 98 "Enclosed and Dead Front Switches" and NEMA KS 1 "Enclosed Switches," quick-make, quick-break heavy-duty units.

B. Rating: Load-breaking capacity in excess of the normal horsepower rating for the switch.

C. Withstand Capability: In excess of the let-through current permitted by its fuse when subject to faults up to 100,000 RMS symmetrical amperes.

D. Operation: By means of external handle.

E. Interlock: Prevents access to switch interior except when in "off" position.

F. Fuse Clips: Rejection type.

G. Padlocking Provisions: For 2 padlocks, whether open or closed.

H. Enclosure for Independent Mounting: NEMA Type 1 enclosure except as otherwise indicated or required to suit environment where located.

2.5 MOLDED-CASE CIRCUIT BREAKERS

A. General: UL 489, "Molded Case Circuit Breakers and Circuit Breaker Enclosures," and NEMA AB 1, "Molded Case Circuit Breakers."

B. Construction: Bolt-in type, except breakers 225-ampere frame size and larger may be plug-in type if held in place by positive locking device requiring mechanical release for removal.

C. Construction: Bolt-in type, except breakers in load-center-type panelboards and breakers 225-ampere frame size and larger may be plug-in type if held in place by positive locking device requiring mechanical release for removal.

D. Characteristics: Indicated frame size, trip rating, number of poles, and a short-circuit interrupting capacity rating of 10,000 amperes symmetrical, unless a greater rating is indicated.

E. Tripping Device: Quick-make, quick-break toggle mechanism with inverse-time delay and instantaneous overcurrent trip protection for each pole.

F. Enclosure for Panelboard Mounting: Suitable for panel mounting in switchboard or panelboards where indicated.

G. Enclosure for Independent Mounting: NEMA Type 1 enclosure, except as otherwise indicated or required to suit environment where located.

PART 3 EXECUTION

3.1 INSTALLATION

A. Independently Mounted OCPDs: Locate as indicated and install in accordance with manufacturer's written installation instructions.

B. OCPDs in distribution equipment shall be factory installed.

3.2 IDENTIFICATION

A. Identify components in accordance with Division 16 Section "Electrical Identification."

3.3 CONTROL WIRING INSTALLATION

A. Install wiring between OCPDs and control/indication devices as specified in Division 16 Section "Wires and Cables" for hard wired connections.

3.4 CONNECTIONS

A. Check connectors, terminals, bus joints, and mountings for tightness. Tighten field-connected connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A and UL 486B.

3.5 GROUNDING

A. Provide equipment grounding connections for individually mounted OCPD units as indicated and as required by MEC. Tighten connectors to comply with tightening torques specified in UL Standard 486A to assure permanent and effective grounding.

3.6 FIELD QUALITY CONTROL

A. Independent Testing Organization: Arrange and pay for the services of an independent electrical testing organization to perform tests and observations on OCPDs.

B. Reports: Prepare written reports certified by testing organization on tests and observations. Report defective materials and workmanship and unsatisfactory test results. Include complete records of repairs and adjustments made.

C. Labeling: Upon satisfactory completion of tests and related effort, apply a label to tested components indicating test results, date, and responsible organization and person.

D. Schedule visual and mechanical inspections and electrical tests with at least one week's advance notification.

E. Pretesting: Upon completing installation of the system, perform the following preparations for independent tests:

1. Make insulation resistance tests of OCPD buses, components, and connecting supply, feeder, and control circuits.
2. Make continuity tests of circuits.
3. Provide set of Contract Documents to test personnel. Include full updating on final system configuration and parameters where they supplement or differ from those indicated in original Contract Documents.
4. Provide manufacturer's instructions for installation and testing of OCPDs to test personnel.

F. Visual and mechanical inspection: Include the following inspections and related work.

1. Overcurrent-Protective-Device Ratings and Settings: Verify indicated ratings and settings to be appropriate for final system arrangement and parameters. Where discrepancies are found, test organization shall recommend final protective device ratings and settings. Use accepted revised ratings or settings to make the final system adjustments.
2. Inspect for defects and physical damage, NRTL labeling, and nameplate compliance with current single line diagram.
3. Exercise and perform operational tests of all mechanical components and other operable devices in accordance with manufacturer's instruction manual.
4. Check tightness of electrical connections of OCPDs with calibrated torque wrench. Refer to manufacturer's instructions for proper torque values.
5. Clean OCPDs using manufacturer's approved methods and materials.

6. Verify installation of proper fuse types and ratings in fusible OCPDs.

G. Electrical Tests: Include the following items performed in accordance with manufacturer's instructions:
1. Insulation resistance test of OCPD conducting parts. Insulation resistance less than 100 megohms is not acceptable.
2. Contact resistance test or measurement of millivolt drop across contacts of drawout circuit breakers and fused power circuit devices at rated current. Compare contact resistance or millivolt drop values of adjacent poles and of similar breakers. Deviations of more than 50 percent are not acceptable.
3. Insulation resistance test of fused power circuit devices and insulated-case and molded-case circuit breakers over 600-ampere frame size at 1000 V d.c. for one minute from pole to pole and from each pole to ground with breaker closed and across open contacts of each phase. Insulation resistance less than 100 megohms is not acceptable.
4. Use primary current injection to check performance characteristics of trip units of molded-case breakers over 600-ampere frame size. Trip characteristics not falling within manufacturer's published time-current characteristic tolerance bands when adjusted to approved parameters are not acceptable. Perform the following tests:
   a. Determine minimum pickup current acceptable per manufacturer's instructions.
   b. Determine long-time delay at 300 percent pickup current.
   c. Determine short-time-pickup current and corresponding delay time.
   d. Determine ground-fault current pickup and corresponding delay time.
   e. Determine instantaneous pickup current value.

5. Make adjustments for final settings of adjustable-trip devices.
6. Activate auxiliary protective devices such as ground fault or undervoltage relays, to verify operation of shunt-trip devices.
7. Check operation of electrically operated OCPDs in accordance with manufacturer's instructions.

H. Retest: Correct deficiencies identified by tests and observations and provide retesting of OCPDs by testing organization. Verify by the system tests that specified requirements are met.

3.7 CLEANING

A. Upon completion of installation, inspect OCPDs. Remove paint splatters and other spots, dirt, and debris. Touch up scratches and mars of finish to match original finish.

3.8 DEMONSTRATION

A. Training: Arrange and pay for the services of factory-authorized service representatives to demonstrate OCPDs and train Owner's maintenance personnel.

B. Conduct a minimum of one half day of training in operation and maintenance as specified under "Instructions to Owner Employees" in the "Project Closeout" Section of these specifications. Include both classroom training and hands-on equipment operation and maintenance procedures.

C. Schedule training with at least seven days' advance notification.

3.9 COMMISSIONING

A. Infrared Scanning: After Substantial Completion, but not more than 2 months after Final Acceptance, perform an infrared scan of OCPDs including their line and load connections, fuses, and fuse clips. Also scan OCPD contact structures where accessible to a portable scanner. Include individual OCPDs and those installed in switchboards, panelboards, and motor control centers.

B. Follow-up Infrared Scanning: Perform two additional follow-up infrared scans of the same devices: one four months after Substantial Completion, and one 11 months after Substantial Completion.

C. Instrument: Use an infrared scanning device designed to measure temperature or detect significant deviations from normal values. Provide documentation of device calibration.

D. Record of Infrared Scanning: Prepare a certified report identifying all OCPDs checked and describing results of scanning. Include notation of deficiencies detected, remedial action taken, and rescanning observations after remedial action.

END OF SECTION 16475

SECTION 16721

FIRE ALARM SYSTEM

FILED SUB-BID

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and various Specification Sections apply to the work of this Section.

B. Requirements of the following Division 16 Sections apply to this Section:
   1. "Basic Electrical Requirements."
   2. "Basic Electrical Materials and Methods."

1.2 SUMMARY

A. Furnish all labor, equipment, materials and performance of all operations in connection with the installation of a complete Fire Alarm System as described herein and as shown on the plans; to be wired, connected and left in first class operating condition.

B. The equipment described and furnished under these specifications shall be the standard product of one manufacturer. All reference to model numbers and other pertinent information herein is intended to establish the standards of performance, quality and appearance. Proposed systems are based on Notifier equipment.

C. Any material and/or equipment necessary for the proper operation of the system not specified or shown on drawings shall be deemed part of this specification.

1.3 DEFINITIONS

A. Alarm Initiating Device: A manual pull station, smoke detector, heat detector or duct smoke detector.

B. Alarm Signal: Signifies a state of emergency requiring immediate action. Pertains to signals such as the operation of a manual station and smoke detector.

C. Supervisory Signal: Indicates need for action regarding fire suppression or other protective system.

D. Trouble Signal: Indicates that a fault, such as an open circuit or ground, has occurred in the system.

1.4 SYSTEM DESCRIPTION

A. Automatic and manual fire alarm detection system

B. System: Microprocessor based, addressable device type.

C. This section includes fire alarm systems. It includes requirements for system components including, but not limited to the following:
   1. Fire alarm central control panel.
   2 Remote supervised LCD annunciators.
   3. Addressable analog smoke detectors.
   4. Addressable analog heat detectors.
   5. Combination speaker strobe assemblies, UL 1971/ADA approved.
   6. Fire alarm strobe lights, UL 1971/ADA approved.
   7. Addressable manual pull stations.

1.5 SYSTEM COMPLIANCE

A. NFPA 72 –National Fire Alarm Code

B. NFPA 101 - Life Safety Code

C. MEC - Massachusetts Electric Code.

D. Local and state building codes

E. All requirements of the Local Authority Having Jurisdiction

F. UL 864 - Control Units for Fire Protective Signaling Systems

G. UL 268A - Smoke Detectors for Duct Applications

H. UL 217 - Smoke Detectors, Single and Multiple Station

I. UL 521 - Heat Detectors for Fire Protective Signaling Systems

J. UL 464 - Audible Signaling Appliances

K. UL 1971 - Visual Signaling Appliances

L. UL 1481 - Power supplies for Fire Protective Signaling Systems

M. UL UUJS - Supplier shall be an Approved Service Company as per UL Directory of Fire Protection

N. UL UOJZ - All control equipment shall be listed under UL category UOJZ as a single control unit. Partial listing shall be NOT be acceptable.

1.6 SYSTEM FUNCITIONAL OPERATION

A. System Alarm Detection and Reporting

1. When a fire alarm condition is detected and reported by one of the system initiating devices or appliances the following functions shall immediately occur:
   a. The System Alarm LED shall flash. A local Piezo-Electric signal in the control panel shall sound.
   b. The 80-character LCD display shall indicate all information associated with the Fire Alarm condition, including: type of alarm point, its location within the protected premises, and the time and date of that activation.
   c. If any of the available optional serially connected equipment is being used, then each of the connected peripherals will display/print the information associated with the Fire Alarm Control Panel condition, including the time/date stamping of the change of status event.
   d. All audible alarm indicating appliances shall sound continuously until alarm silence switch is operated.
   e. All visible alarm indicating appliances shall flash continuously until alarm silence switch is operated.
   f. All system output programs assigned via control-by-event equations to be activated by the particular point in alarm shall be executed, and the associated System Outputs (Alarm Indicating Appliances and/or relays) shall be activated. Unacknowledged alarm messages shall have priority over trouble messages, and if such an Alarm occurs during a Trouble sequence, the Alarm condition will have display priority.
   g. Transmit alarm to central monitoring via leased telephone lines.
   h. Interconnect system to City of Egremont central station monitoring/ call box system. Provide dialer and monitoring module.

B. System Common Control Switch Operation

1. Activation of the control panel Acknowledge switch in response to single new Alarm and/or Trouble condition shall silence the local panel piezo electric signal and change the System Alarm or Trouble LED from flashing mode to steady-ON mode. If additional new Alarm or Trouble conditions exist or are detected and reported in the system, depression of this switch shall advance the 80-character LCD display to the next Alarm or Trouble condition.
2. In this case, the local Piezo sounder shall not silence, and the Alarm/Trouble LEDs shall not transfer to their steady-on mode, thus signaling to the operator that more Alarm/Trouble conditions are present in the system.
3. Alarm conditions shall always have display priority before Trouble conditions.
4. Depression of the Acknowledge switch shall also cause a corresponding (time-stamped) message to be displayed on all system peripheral equipment.
5. Occurrence of any new Alarm or Trouble conditions in the system shall cause the Control Panel to resound the Local piezo sounder and repeat the Alarm or Trouble sequences.

C. Signal Silence Switch

1. Activation of the Signal Silence Switch shall cause all programmed Alarm Indicating Appliances and relays to return to the normal condition after an alarm condition. The selection of indicating circuits and relays, which are silenceable by this switch, shall be fully field programmable within the confines of all applicable standards.

D. System Reset Switch
1. Activation of the System Reset Switch shall cause all electronically-latched initiating devices, appliances or software zones, as well as all associated output devices and circuits, to return to their normal condition.
2. If the alarm condition(s) still exist, or if they re-occur in the system after System Reset Switch activation, the system shall then resound the alarm conditions.

E. System Test Switch
1. Activation of the System Test Switch shall initiate an automatic test of all Intelligent/Addressable detectors in the system. The System Test shall activate the electronics in each intelligent sensor, simulating an alarm condition and causing the transmission of the alarm condition from that sensor to the Fire Alarm Control Panel. The Fire Alarm Control Panel shall interpret the data from each sensor installed in the system. A report summarizing the results of this test shall be displayed automatically on the System Liquid Crystal Display, as well as on any CRTs or printers in the System.

F. Lamp Test Switch
1. Activation of the Lamp Test Switch shall sequentially turn on all LED indicators, System Liquid Crystal Display and Local Piezo-Electric signal, and then automatically return the Fire Alarm Control Panel to the previous condition.

G. Field Programming
1. 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.
2. All programming shall be accomplished through the standard common control panel keyboard or through the use of the optional CRT-1 keyboard. All field defined programs shall be stored in non-volatile memory.
3. The programming function shall be enabled with a special 5-digit password that may be defined specifically for the system when it is installed.
4. This password may be changed to a new value at any time by the installing Distributor. In the event that the Installing Distributor may define a password and then lose or forget it, the system shall be designed so that the valid password may be determined by special procedures available through the system manufacturer.
5. The system shall provide means for automatic programming of its operation to conform with certain N.F.P.A. Standards through internal software.

H. Smoke Detector Sensitivity Adjust

1. Means shall be provided for adjusting the sensitivity of all analog intelligent detectors in the system from the System keypad or from the keyboard of the CRT-1. Sensitivity range shall be within the allowed UL window, and shall be a HIGH/MEDIUM/LOW selection.

I. System Reports

1. The system will be able to generate and print a summary of all of the Detectors, Modules, Pull Stations, and Zones which are currently active in the System. This printout will require password protection to prevent unauthorized user access, and will automatically print the system report using "soft" (single push) keys. No computer expertise will be required to initiate the System Report sequence.

J. System Annunciator Trouble Display

1. Upon the receipt of a trouble condition from any annunciator in the system, the following information shall be displayed and (optionally) printed:

   Device Status
   Annunciator Module Identification
   Specific Trouble Message
   Time and Date of Trouble Condition
   Trouble Index Code

K. System History Recording and Reporting The Fire Alarm

1. Control Panel shall contain a History Buffer, which will be capable of storing up to 800 events in nonvolatile memory with separate 200 event alarm-only file.
2. Each of these activations will be stored and time and date stamped with the actual time of the activation, until a password authorized operator requests that the contents be either displayed, or printed.
3. 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.
4. History Buffer Reports (whether Displayed or Printed) will be instantly distinguishable from all other displayed or printed system reports through the use of a semicolon in the time/date stamp of the data.

L. Automatic Detector Maintenance Alert

1. The Fire Alarm Control Panel shall automatically interrogate each Intelligent System Detector and shall analyze the detector responses over a period of time.
2. If any Intelligent Detector in the system responds with a reading which is below 20% of normal limits (for 5 out of 6 polls), or above 80% of normal limits for a period of 26 hours, then the system will enter the Trouble Mode, and the particular Intelligent Detector will be annunciated on the System 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.

1.7 SUBMITTALS

A. Submit shop drawings and product data in accordance with General Conditions of Contract and Specifications.

B. Indicate system components, size of components, location, and provide full schematic of wiring system showing building and operation details. Also list materials and NRTL listing data.

C. Submit manufacturer's descriptive literature and maintenance data for inclusion in Operating and Maintenance Manual specified in Division 16 Section "Basic Electrical Requirements." Operation and maintenance data shall cover each type of product, including all features and operating sequences, both automatic and manual. Provide spare parts data. Provide the name, addresses, and telephone numbers of service organizations that carry stock of repair parts for the system to be furnished.

D. Product certification signed by the manufacturer of the fire alarm system components certifying that their products comply with the referenced standards.

E. Submission to Authority Having Jurisdiction: In addition to routine submission of the above material, make a simultaneous identical submission to the authority having jurisdiction. Include copies of annoted Contract Drawings as required to depict components locations to facilitate review. Upon receipt of comments from the authority, submit a copy of the mark-up submittal for review. Make resubmissions to the authority if required to make clarifications or revisions to obtain approval.

F. Calculations for battery capacity for both fire alarm & supervisory modes.

G. Have manufacturer submit on completion of system verification a point-by-point check list indicating the date and time of each item inspected and issue a certificate, confirming that the inspection has been completed and the system is installed and functioning in accordance with the specifications.

1.8 QUALITY ASSURANCE

A. Manufacturer: Company specializing in fire alarm systems with five (5) years documented experience.

B. Installer Qualifications: Engage an experienced Installer who is factory-authorized service representative to perform the Work of this Section.

C. UL Listing and Labeling: Provide system and components specified in this Section that are listed and labeled by UL.

D. Single-Source Responsibility: Obtain fire alarm components from a single source who assumes responsibility for compatibility for system components furnished.

1.9 MAINTENANCE SERVICE

A. Maintenance Service Contract: Provide maintenance of fire alarm systems and equipment for a period of 12 months commencing with Substantial Completion, using factory-authorized service representatives, located within 70 miles of the site.

1. Basic services: Systematic, routine maintenance visits on a monthly basis at times coordinated with the Owner. In addition, respond to service calls within 24 hours of notification of system trouble. Adjust and replace defective parts and components with original manufacturer's replacement parts, components, and supplies.
2. Additional Services: Perform services within the above 12-month period not classified as routine maintenance or as warranty work when authorized in writing. Compensation for additional services must be agreed upon in writing prior to performing services.
3. Renewal of Maintenance Service Contract: No later than 60 days prior to the expiration of the maintenance services contract, deliver to the Owner a proposal to provide contract maintenance and repair services for an additional one-year term. Owner will be under no obligation to accept maintenance service contract renewal proposal.

1.10 EXTRA MATERIALS

A. General: Furnish extra materials matching products installed, as described below, packaged with protective covering for storage, and identified with labels clearly describing contents.

B. Lamps for Strobe Units: Furnish quantity equal to 10 percent of the number of units installed, but not less than one.

C. Smoke Detectors, & Heat Detectors: Furnish quantity equal to 10 percent of the number of units of each type installed but not less than three (3) of each type.

D. Detector Bases: Furnish quantity equal to 2 percent of the number of units of each type installed but not less than one (1) of each type.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements (and Engineers approval), provide products by one of the following:

1. Notifier; (Design Based)
2. Farenhyt
3. EST
4. Siemens

2.2 EQUIPMENT AND MATERIAL, GENERAL:

A. 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 protective signaling system, meeting the National Fire Alarm Code as amended by the Commonwealth of Massachusetts.

B. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

C. 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.

D. The design is based on Notifier.

2.3 CONDUIT AND WIRE:

A. Conduit:

1. Conduit shall be in accordance with The Massachusetts Electrical Code (MEC), local, state and specification requirements. Refer to other Division 16 specification sections.
2. All wiring shall be installed in conduit or raceway. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.
3. 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 MEC Article 760.
4. Wiring for 24 volt DC 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.
5. Conduit shall not enter the fire alarm control panel, or any other remotely mounted control panel equipment or backboxes, except where conduit entry is specified by the FACP manufacturer.
6. Conduit shall be 1/2 inch (19.1 mm) minimum.
7. Contractor may utilize fire alarm MC cable in concealed spaces.

B. Wire:

1. Fire alarm system wiring shall be new and part of this contract.
2. Wiring shall be in accordance with local, state and national codes (e.g., MEC 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 (1.63 mm) for notification appliance circuits.

C. Terminal Boxes, Junction Boxes and Cabinets:
   1. All boxes and cabinets shall be UL listed for their use and purpose.

D. Initiating circuits shall be arranged to serve like categories (manual, smoke, waterflow). Mixed category circuitry shall not be permitted except on signaling line circuits connected to intelligent reporting devices.

E. The fire alarm control panel 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. Provide lock-out for circuit breaker. Fire alarm control panel primary power wiring shall be 12 AWG. The control panel cabinet shall be grounded securely per manufacturer and MEC requirements.

2.4 MAIN FIRE ALARM CONTROL PANEL

A. The FACP shall be a NOTIFIER model NFW-50X and shall contain a microprocessor based Central Processing Unit (CPU) and power supply in an economical space saving single board design. The CPU shall communicate with and control the following types of equipment used to make up the system: intelligent addressable smoke and thermal (heat) detectors, addressable modules, printer, annunciators, digital dialer and other system controlled devices. Ethernet Communicators and other system controlled devices. Ethernet communications shall be via a IPOTs card.

B. Operator Control
   1. Acknowledge Switch:
      a. Activation of the control panel acknowledge switch in response to new alarms and/or troubles shall silence the local panel piezo electric signal alarm or trouble conditions exist, depression of this switch shall advance the 80-character LCD display to the next alarm or trouble condition.
      b. Depression of the Acknowledge switch shall also silence all remote annunciator piezo sounders.
   2. Alarm Silence Switch:
      a. Activation of the alarm silence switch shall cause all programmed alarm notification appliances and relays to return to the normal condition after an alarm condition. The selection of notification circuits and relays that are silenceable by this switch shall be fully field programmable within the confines of all applicable standards. The FACP software shall include silence inhibit and auto-silence timers.
   3. Alarm Activate (Drill) Switch:
      a. The Alarm Activate switch shall activate all notification appliance circuits. The drill function shall latch until the panel is silenced or reset.

   4. System Reset Switch
      a. Activation of the System Reset switch shall cause all electronically-

latched initiating devices, appliances or software zones, as well as all associated output devices and circuits, to return to their normal condition.

5. Lamp Test:
   a. The System RESET switch shall also function as a Lamp Test switch shall activate all system LEDs and light each segment of the liquid crystal display.
6. Programmable Buttons:
   a. The system should have at a minimum 4 programmable function keys for quick zone and NAC disable during maintenance.

C. System Capacity and General Operation
1. The control panel shall provide, or be capable of, expansion to 50 intelligent/addressable devices.
2. The control panel shall include two Form-C programmable relays which can be used for Alarm, Supervisory, and a fixed Trouble relay rated at a minimum of 2.0 amps @ 30 VDC and 0.5 amps @ 30 VAC.
3. It shall also include two programmable Notification Appliance Circuits (NACs) capable of being wired as Class B (NFPA Style Y) or Class A (NFPA Style Z).
4. The fire alarm control panel shall include an operator interface control and annunciation panel that shall include a backlit Liquid Crystal Display (LCD), individual color-coded system status LEDs, and an alphanumeric keypad for the field programming and control of the fire alarm system.
5. All programming or editing of the existing program in the system shall be achieved without special equipment and without interrupting the alarm monitoring functions of the fire alarm control panel. The system shall be fully programmable, configurable, and expandable in the field without the need for special tools, PROM programmers or PC based programmers. It shall not require replacement of memory ICs to facilitate programming changes. The control unit will support the ability to upgrade its operating program using FLASH memory technology. The unit shall provide the user with the ability to program from either the included keypad, or a USB drive programmed from a computer running upload/download program utility.
6. The system shall allow the programming of any input to activate any output or group of outputs. Systems which have limited programming (such as general alarm), have complicated programming (such as a diode matrix), or REQUIRE a laptop personal computer are not considered suitable substitutes.
7. The FACP shall provide the following features:
   a. Drift compensation to extend detector accuracy during the accumulation of dust and foreign material.
   b. Detector sensitivity test, meeting requirements of NFPA 72, Maintenance alert, with two levels (maintenance alert/maintenance urgent), to warn of excessive smoke detector dirt or dust accumulation.
   c. The ability to display or print system reports.
   d. Alarm verification. Alarm verification, with counters and a trouble indication to alert maintenance personnel when a detector enters verification an excessive number of times.

e. Positive Alarm Sequence (PAS presignal), meeting NFPA 72 requirements.
f. Rapid manual station reporting.
g. Non-alarm points for general (non-fire) control.
h. Periodic detector test, conducted automatically by the software.
i. Walk test, with a check for two detectors set to same address.
j. Universal end of line resistor for NACs and remote sync output
k. Temporal-4 NAC coding for CO alarms.
l. Built in Class-A capability for all 4 NACs.
m. Local upload/download using USB drive.
n. Flash firmware with USB thumb drive.

8. The FACP shall be capable of coding Notification Appliance Circuits in March Time Code (120 PPM), Temporal (NFPA 72) for fire alarm and CO alarm, and California Code. Main panel notification circuits (NACs 1 & 2) shall also automatically syn-chronize and be programmable for any of the following manufacturer's notification appliances connected to them: System Sensor, Wheelock, or Gentex with no need for additional synchronization modules.

D. Central Microprocessor

1. The microprocessor shall be a state-of-the-art; high speed device and it shall communicate with, monitor and control all external interfaces. It shall include hardware for system program storage, non-volatile memory for building-specific program storage, and a "watch dog" timer circuit to detect and report microprocessor failure.
2. The microprocessor shall contain and execute all specific actions to be taken in the condition of an alarm. Control programming shall be held in non-volatile programmable memory, and shall not be lost even if system primary and secondary power failure occurs.
3. The microprocessor shall also provide a real-time clock for time annotation of system displays, printer, and history file.
4. A special program check function shall be provided to detect common operator errors.
5. An auto-programming capability (self-learn) shall be provided to quickly identify de-vices connected on the SLC and make the system operational.
6. For flexibility and to ensure program validity, an optional Windows(TM) based program utility shall be available. This program shall be used to off-line program the system with batch upload/download. This program shall also have a verification utility which scans the program files, identifying possible errors. It shall also have the ability to compare old program files to new ones, identifying differences in the two files to allow complete testing of any system operating changes. This shall be in incompliance with the NFPA 72 requirements for testing after system modification.

E. Display

1. The display shall provide all the controls and indicators used by the system operator and may also be used to program all system operational parameters.

2. The display shall include status information and custom alphanumeric labels for all intelligent detectors, addressable modules, internal panel circuits, and software zones.
3. The display shall contain an alphanumeric, text-type display and dedicated LEDs for the annunciation of AC POWER, FIRE ALARM, SUPERVISORY, TROUBLE, ALARM SILENCED and CO Alarm conditions.
4. The display keypad shall be part of the standard system and have the capability to command all system functions, entry of any alphabetic or numeric information, and field programming. Two different password levels shall be provided to prevent un-authorized system control or programming.
5. The display shall include the following operator control switches: ACKNOWLEDGE/STEP, ALARM SILENCE, DRILL (alarm activate), and SYSTEM RESET.

F. Signaling Line Circuits (SLC)
1. The SLC interface shall provide power to and communicate with up to 50 devices of any type including: intelligent detectors (ionization, photoelectric, multi-sense, CO or thermal), addressable pull stations, intelligent modules (monitor or control). Each SLC shall be capable of NFPA 72 Style 4, Style 6, or Style 7 (Class A or B) wiring.
2. The CPU shall receive information from all intelligent detectors to be processed to determine whether normal, alarm, pre-alarm or trouble conditions exist for each detector. The software shall automatically compensate for the accumulation of dust in each detector up to allowable limits. The information shall also be used for automatic detector testing and for the determination of detector maintenance conditions.
3. The detector software shall meet NFPA 72 requirements and be certified by UL as a calibrated sensitivity test instrument.

G. Serial Interfaces
1. The system shall provide a means of interfacing to UL Listed Electronic Data Processing (EDP) peripherals using the EIA-232 communications standard.
2. An annunciator RS-485 (ANN-Bus) bus shall be used to connect an UL-Listed 80-column printer anywhere within the 6,000 range of the serial bus connection. The printer shall communicate with the control panel using an RS-485 converter/interface complying with Electrical Industries Association standard EIA-232D. Power to the printer shall be 120 VAC @ 60 Hz. The interface shall contain both a 9-pin serial and standard centronics parallel connector. Either shall be capable of connection to a serial or parallel printer. The bus shall also provide connection to additional addressable modules supporting remote 80 character LCD text annunciators that mimic the standard panel display and controls. Said annunciators shall support remote acknowledge, silence, drill and reset functions and shall be enabled via a keyswitch. The bus shall also provide connection to addressable modules supporting up to 40 LEDs for use with a graphic annunciator. The bus shall also provide connection to programmable relay modules. The bus shall also provide connection to addressable LED

annunciators.

H. The control panel will have the capability of Reverse Polarity Transmission or connection to a Municipal Box for compliance with applicable NFPA standards.

I. Internet Protocol Over Telephone Service (IPOTS) is an interface for communicating digital information between a fire alarm control panel and a UL-Listed central station. The IPOTs module is capable of transmitting contact ID formatted alarms to a central station equipped with a compatible IP receiver via Ethernet over a private or public WAN/LAN, Intranet or Ethernet.

1. The IPOTS communicator shall be an integral module component of the fire alarm control panel enclosure.
2. The IPOTS communicator shall be completely field-programmable locally from a USB port or via Ethernet,Telnet and through AlarmNet.
3. The IPOTS communicator shall be capable of transmitting events in contact ID format.
4. Communication shall include vital system status such as:
   a. Independent Zone (Alarm, trouble, non-alarm, supervisory)
   b. Independent Addressable Device Status
   c. AC (Mains) Power Loss
   d. Low Battery and Earth Fault
   e. System Off Normal
   f. 12 and 24 Hour Test Signal
   g. Abnormal Test Signal (per UL requirements)
   h. EIA-485 Communications Failure
   i. IP Line Failure

5. The IPOTS communicator shall support independent zone/point reporting. In this format, the IPOTS shall support the transmission of addressable points within the system. This format shall enable the central station to have exact details concerning the location of the fire for emergency response. The communication over IP / cellular shall be transparent to the panels normal operation over phone lines.
6. The IPOTS communicator shall utilize a supervisory heart beat signal of no less than once every 90 seconds insuring multiplexed level line supervision. Loss of Internet or Intranet connectivity shall be reported in no more than 200 seconds. This IPOTS communicator can also can program communication in supervisor according to all NFPA guidelines. Alarm events shall be transmitted to a central station in no less than 90 seconds from time of initiation to time of notification.

J. Enclosures:

1. The control panel shall be housed in a UL-listed cabinet suitable for surface or semi-flush mounting. The cabinet and front shall be corrosion protected, given a rust-resistant prime coat, and painted (red or black) via manufacturer's standard finish.
2. The back box and door shall be constructed of steel with provisions for electrical

conduit connections into the sides and top.

3. The door shall provide a key lock and shall provide for the viewing of all indicators.
4. The cabinet shall accept a chassis containing the PCB and to assist in quick replacement of all the electronics including power supply shall require no more than two bolts to secure the panel to the enclosure back box.
5. The cabinet shall also support a mechanical secured optional dress panel limiting access to the internals of the panel.

K. Field Charging Power Supply (FCPS)

1. The FCPS-24S6/8 is a device designed for use as either a remote 24 volt power supply or used to power Notification Appliances.
2. The FCPS-24S8 shall offer up to 6.0 amps (4.0 amps continuous) of regulated 24 volt power. It shall include an integral charger designed to charge up to 18.0 amp hour batteries and to support 60 hour standby. The FCPS-24S8 shall offer up to 8.0 amps (6.0 amps continuous) of regulated 24 volt power. It shall include an integral charger designed to charge up to 18.0 amp hour batteries and to support 60 hour standby.
3. The Field Charging Power Supply shall have two input triggers. The input trigger shall be a Notification Appliance Circuit (from the fire alarm control panel) or a relay. Four outputs (Style Y or Z) shall be available for connection to the Notification devices.
4. The FCPS shall optionally provide synchronization of all connected strobes or horn-strobe combinations when System Sensor, Wheelock or Gentex devices are installed.
5. The FCPS shall function as a sync follower as well as a sync generator.
6. The Field Charging Power Supply shall include an attractive surface mount back box.
7. The Field Charging Power Supply shall include the ability to delay the AC fail delay per NFPA requirements.
8. The Field Charging Power Supply includes power limited circuitry, per UL standards.
9. The Field Charging Power Supply shall use the same key type as the fire alarm control panel and fire command center.

L. Power Supply:

1. The main power supply for the fire alarm control panel shall provide 3.0 amps of available power for the control panel and peripheral devices.
2. Provisions will be made to allow the audio-visual power to be increased as required by adding modular expansion audio-visual power supplies.
3. Positive-Temperature-Coefficient (PTC) thermistors, circuit breakers, or other over-current protection shall be provided on all power outputs. The power supply shall provide an integral battery charger or may be used with an external battery and charger systems. Battery arrangement may be configured in the field.
4. The main power supply shall continuously monitor all field wires for earth ground conditions.

5. The main power supply shall operate on either 120VAC, 60 Hz or 240 VAC, 60 Hz and shall provide all necessary power for the FACP.

2.5 SYSTEM COMPONENTS:

A. Programmable Electronic Sounders:
   1. Electronic sounders shall operate on 24 VDC nominal.
   2. Electronic sounders shall be field programmable without the use of special tools, to provide slow whoop, continuous, or interrupted tones with an output sound level of at least 90 dBA measured at 10 feet from the device.
   3. Shall be flush or surface mounted as shown on plans.

B. Strobe lights shall meet the requirements of the ADA, UL Standard 1971, be fully synchronized, and shall meet the following criteria:
   1. The maximum pulse duration shall be 2/10 of one second.
   2. Strobe intensity shall meet the requirements of UL 1971.
   3. The flash rate shall meet the requirements of UL 1971.

C. Audible/Visual Combination Devices:
   1. Shall meet the applicable requirements of Section A listed above for audibility.
   2. Shall meet the requirements of Section B listed above for visibility.

D. Manual Fire Alarm Stations
   1. Manual fire alarm stations shall be non-code, dual action, non-break glass type, equipped with key lock so that they may be tested without operating the handle.
   2. Stations must be designed such that after an actual activation, they cannot be restored to normal except by key reset.
   3. An operated station shall automatically condition itself so as to be visually detected, as operated, at a minimum distance of 100 feet (30.5 m) front or side.
   4. Manual stations shall be constructed of high impact Lexan, with operating instructions provided on the cover. The word FIRE shall appear on the manual station in letters one half inch (12.7 mm) in size or larger.

E. Specific System Operations
   1. Alarm Verification: Each of the intelligent addressable smoke detectors in the system may be independently programmed for verification of alarm signals. The alarm verification time period shall not exceed 2 minutes.
   2. Point Disable: Any addressable device or conventional circuit in the system may be enabled or disabled through the system keypad.
   3. Point Read: The system shall be able to display the following point status diagnostic functions:
      a. Device status
      b. Device type
      c. Custom device label
      d. Device zone assignments

4. System Status Reports: Upon command from an operator of the system, a status report will be generated and printed, listing all system status.

5. System History Recording and Reporting: The fire alarm control panel shall contain a history buffer that will be capable of storing up to 500 events. Each of these activations will be stored and time and date stamped with the actual time of the activation. The contents of the history buffer may be manually reviewed, one event at a time, or printed in its entirety.
   a. The history buffer shall use non-volatile memory. Systems that use volatile memory for history storage are not acceptable substitutes.
6. Automatic Detector Maintenance Alert: The fire alarm control panel shall automatically interrogate each intelligent 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 above or below normal limits, then the system will enter the trouble mode, and the particular detector will be annunciated on the system display. 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.
7. Pre-Alarm Function: The system shall provide two levels of pre-alarm warning to give advance notice of a possible fire situation. Both pre-alarm levels shall be fully field adjustable. The first level shall give an audible indication at the panel. The second level shall give an audible indication and may also activate control relays. The system shall also have the ability to activate local detector sounder bases at the pre-alarm level, to assist in avoiding nuisance alarms.
8. The fire alarm control panel shall include Silent and Audible Walk Test functions - Silent and Audible. It shall include the ability to test initiating device circuits and Notification Appliance Circuits from the field without returning to the panel to reset the system. The operation shall be as follows:
   a. The Silent Walk Test will not sound NACs but will store the Walk Test information in History for later viewing.
   b. Alarming an initiating device shall activate programmed outputs, which are selected to participate in Walk Test.
   c. Introducing a trouble into the initiating device shall activate the programmed outputs.
   d. Walk Test shall be selectable on a per device/circuit basis. All devices and circuits which are not selected for Walk Test shall continue to provide fire protection and if an alarm is detected, will exit Walk Test and activate all programmed alarm functions.
   e. All devices tested in walk test shall be recorded in the history buffer.

9. Supervisory Operation
   a. An alarm from a supervisory device shall cause the appropriate indication on the control panel display, light a common supervisory LED, but will not cause the system to enter the trouble mode.
10. Signal Silence Operation
   a. The FACP shall have the ability to program each output circuit (notification circuit or relay) to deactivate upon depression of the Signal Silence switch.
11. Non-Alarm Input Operation
   a. Any addressable initiating device in the system may be used as a non-alarm input to monitor normally open contact type devices. Non-alarm functions are a lower

priority than fire alarm initiating devices.

2.6 SYSTEM COMPONENTS - ADDRESSABLE DEVICES

A. Addressable Devices - General

1. Addressable devices shall employ the simple-to-set decade addressing scheme. Addressable devices which use a binary-coded address setting method, such as a DIP switch, are not an allowable substitute.
2. Detectors shall be addressable and intelligent, and shall connect with two wires to the fire alarm control panel signaling line circuits.
3. Addressable smoke and thermal (heat) 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. An output connection shall also be provided in the base to connect an external remote alarm LED. 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.
4. Detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature. Base options shall include a base with a built-in (local) sounder rated for a minimum of 85 DBA, a relay base and an isolator base designed for Style 7 applications.
5. Detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel.
6. Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (ION, PHOTO, THERMAL, CO). Detectors shall provide address-setting means using decimal switches.

B. Addressable Manual Fire Alarm 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 dual action and 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 (44 mm) or larger.

C. 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.
2. The detectors shall be ceiling-mounted and available in an alternate model with

an integral fixed 135-degree heat-sensing element.

3. Each detector shall contain a remote LED output and a built-in test switch.
4. Detector shall be provided on a twist-lock base.
5. It shall be possible to perform a calibrated sensitivity and performance test on the detector without the need for the generation of smoke. The test method shall test all detector circuits.
6. A visual indication of an alarm shall be provided by dual latching Light Emitting Diodes (LEDs), on the detector, which may be seen from ground level over 360 degrees. These LEDs shall periodically flash to indicate that the detector is in communication with the control panel.
7. The detector shall not go into alarm when exposed to air velocities of up to 1500 feet per minute (fpm).
8. The detector screen and cover assembly shall be easily removable for field cleaning of the detector chamber.
9. All field wire connections shall be made to the base through the use of a clamping plate and screw.

D. 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
2. A high heat thermal detector rated at 190 degrees Fahrenheit shall also be available.
3. The thermal detectors shall connect via two wires to the fire alarm control panel signaling line circuit.

E. Addressable Dry Contact Monitor Module

1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices (any normally open dry contact device) to one of the fire alarm control panel SLCs.
2. The monitor module shall mount in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box.
3. The IDC zone shall be suitable 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 (70 mm) x 1-1/4 inch (31.7 mm) x 1/2 inch (12.7 mm). This version need not include Style D or an LED.
5. For multiple dry contact monitoring a module shall be available that provides 10 Style B or 5 Style D input circuits.

F. 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
2. The control module NAC may be wired for Style Z or Style Y (Class A/B) with a

current rating of 2 Amps for Style Z and 3 Amps for Style Y.

3. Audio/visual power shall be provided by a separate supervised circuit from the main fire alarm control panel or from a supervised UL listed remote supply.

G. Addressable Relay Module
1. Addressable Relay Modules shall be available for HVAC control and other network building functions.
2. The module shall provide two form C relays rated at up to 3 Amps resistive and up to 2.0 Amps inductive. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to insure that 100% of all auxiliary devices energize at the same time on the same pair of wires.

H. Isolator Module
1. Isolator modules shall be provided to automatically isolate wire-to-wire short circuits on an SLC Class A or Class B branch. 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 segment or branch. 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. When the short circuit condition is corrected, the isolator module shall automatically reconnect the isolated section.
3. The isolator module shall not require 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 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.

I. Serially Connected ANN-BUS Devices
1. The panel shall support serially connected devices, these devices shall communicate with the fire alarm control panel via a two wire EIA 485 (multi-drop) communications circuit and be powered from 24 VDC Ann-Bus shall be capable of wiring distances up to 6,000 feet. System shall support a secondary serial bus. System shall support up to 8 Ann-Bus devices.
2. Supported ANN-BUS devices shall include the following:
   a. 80-Character LCD mimic annunciator capable of remote control of fire alarm panel functions.
   b. LED annunciator
   c. LED driver module for interfacing to custom graphic annunciators
   d. Serial or Parallel Printer driver module
   e. Relay module with up to 10 programmable Form-C relays

2.7 BATTERIES AND EXTERNAL CHARGER:
A. Battery:
1. The battery shall have sufficient capacity to power the fire detection system for not less than twenty-four hours plus 5 minutes of alarm upon a normal AC power

failure.

2. The batteries are to be completely maintenance free. No liquids are required. Fluid level checks for refilling, spills, and leakage shall not be required.
3. If necessary to meet standby requirements, external battery and charger systems may be used.

2.8 SYSTEM COMPONENTS - NOTIFICATION DEVICES

A. Combination speaker/strobe and combination horn/strobe devices shall meet requirements of both U.L. and ADA.
   1. All horns shall operate on 25 VRMS or with field selectable output taps from 0.5 to 2.0 Watts.
      a. Horns in public spaces shall produce a nominal sound output of 87 dBA at 10 feet (3m).

   2. Frequency response shall be a minimum of 400 HZ to 4000 HZ.

B. Strobe lights shall meet the requirements of the ADA, UL Standard 1971, NFPA 72, 2002 edition and shall meet the following criteria:
   1. The pulse duration shall be between minimum of one second and maximum of two seconds.
   2. Strobe intensity shall meet the requirements of UL 1971 and NFPA 72, 2002 edition. Signal shall be produced by a Xenon flash tube.
   3. Combination horn/strobes shall meet the requirements of UL 1971 and NFPA 72, 2002 edition.
   4. All visual units shall be synchronized to meet ADA requirements using DSM12/24R sync modules.
   5. All horns shall also require the use of a DSM12/24R sync modules for temporal code pattern three.

C. All interfaces and associated equipment are to be protected so that they will not be affected by voltage surges or line transients consistent with UL standard 864.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install system in accordance with Standards referenced in Part 1 Section 1.05 “System Compliance”.

B. Installation shall be in accordance with the MEC, NFPA 72, local and state codes, as noted on drawings and as recommended by the equipment manufacturer.

3.2 EQUIPMENT INSTALLATION.

A. Install system in accordance with NFPA Standard referenced in Parts 1 and 2 of this Section.

B. Fire Alarm Power Supply Disconnect: Paint red and label “FIRE ALARM”. Provide with lockable handle or cover.

C. Manual Pull Stations: Unless otherwise indicated mount semi-flush in recessed back boxes with operating handles 42” above finished floor.

D. Audio-Visual Indicating Devices: Install at 80 inches above the finished floor. Unless otherwise indicated, install strobes on flush mounted back boxes with the device operating mechanism concealed behind a grille. Combine audible and visible alarms at the same location into a single unit.

E. Visual Indicating Devices: Install at 80 inches above the finished floor.

F. Fire Alarm Control Panel (FACP): Surface mount with tops of cabinets not more then 6 ft. above the finished floor.

3.3 WIRING INSTALLATION

A. Wiring Method: Install wiring in Electrical Metallic Tubing (EMT) w/steel compression fittings in accordance with Division 16 Section “Raceways.” Conceal raceway except in unfinished spaces and as indicated. Provided acceptable to local authority having jurisdiction, Contractor may utilize Fire Alarm MC cable in concealed spaces. Where raceway cannot be concealed, provide wiremold surface raceway unless otherwise noted.

B. Wiring Within Enclosures: Install conductors parallel wit or at right angles to the sides and back of the enclosure. Bundle, lace, and train the conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal in accordance with the wiring diagrams of the system. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors. C. Cable Taps: Use numbered terminal strips in junction, pull or outlet boxes, cabinets, or equipment enclosures where any circuit tap is made.

C. Alarm Wiring: For the low-voltage portion of the fire alarm system, install No. 14 AWG conductors and 90-deg C insulation. Provide wiring operating at line voltage as minimum No. 12 AWG size having similar insulation.

D. Color Coding: Color code fire alarm indicating circuit conductors differently from the normal building power wiring. Paint fire alarm system junction boxes and covers red.

E. Detectors shall not be installed prior to the system programming and test period. If construction is on-going during this period, measures shall be taken to protect detectors from construction and physical damage.

3.4 GROUNDING

A. Provide 5-ohm ground at main equipment location. Measure, record, and report ground resistance.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and the pretesting, testing, and adjustment of the system.

B. Pretesting: Upon completing installation of the system, align, adjust, and balance the system and perform complete 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. Prepare forms for systematic recording of acceptance test results.

C. Report of Pretesting: After pretesting is complete, provide a letter certifying the installation is complete and fully operable. The letter shall include the names and titles of the witnesses to the preliminary tests.

D. Final Test Notice: Provide 10 days' minimum notice in writing when the system is ready for final acceptance testing.

E. Final system testing will be attended by representatives from the following; Owner's Representative and Consulting Engineering Firm.

F. Minimum System Tests: Test the system in accordance with the procedures outlined in NFPA 72, NFPA 72H, and NFPA 72E. Minimum required tests are as follows:

1. Verify the absence of unwanted voltages between circuit conductors and ground.
2. Megger test all conductors other than those intentionally and permanently grounded with electronic components disconnected. Test for resistance to ground. Report readings less than 1-megahm for evaluation.
3. Test all conductors for short circuits utilizing an insulation testing device.
4. With each circuit pair, short circuit at the far end of the circuit and measure the circuit resistance with an ohmmeter. Record the circuit resistance of each circuit on the record drawings.
5. Verify the control unit is in the normal condition as detailed in the manufacturer's operating and maintenance manual.
6. Test initiating and indicating circuits for proper signal transmission under open circuit conditions. One connection each should be opened at not less than 1-0 percent of the initiating and indicating devices. Proper signal transmission in accordance with class of wiring used shall be observed.
7. Test each initiating and indicating device for alarm operating and proper response at the control unit. Test smoke detectors with actual products of

combustion.

8. Test the system for all specified functions in accordance with the manufacturer's operating and maintenance manual. Systematically initiate specified functional performance items at each station including making all possible alarm and monitoring initiations and using all communications options. For each item, observe related performance at all devices required to be affected by the item under all system sequences. Observe indicating lights, displays, and annunicator indications.
9. Test both primary power and secondary power. Verify, by test, the secondary power system is capable of operating the system for the period and in the manner specified.

G. Retesting: Rectify deficiencies indicated by tests and completely retest work affected by such deficiencies at Contractor's expense. Verify by the system test that the total system meets the Specifications and complies with applicable standards.

H. Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log. Submit log upon the satisfactory completion of tests.

I. Tag all equipment and stations and other components at which tests have been satisfactorily completed. Place tags upon completion of test.

3.6 COMMISSIONING

A. Provide the services of a factory-authorized service representative to demonstrate and train Owner's maintenance personnel as specified below.
   1. Train Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventive maintaining of the system. Provide a minimum of 8 hours' training.
   2. Schedule training with the Owner at least seven days in advance.
   3. Occupancy Adjustments: When requested within one year of date of Substantial Completion, provide on-site assistance in adjusting sound levels and adjusting controls to suit actual occupied conditions. Provide up to three visits to the site for this purpose.

3.7 FINAL INSPECTION

A. At the final inspection, a factory-trained representative of the manufacturer of the major equipment shall demonstrate that the system functions properly in every respect.

3.8 INSTRUCTION

A. Instructions shall be provided as required for operating the system. Hand-on demonstration of the operation of all system components and the entire system including program changes and function shall be provided.

B. The contractor and /or the systems manufacturer's representative shall provide a typewritten "Sequence of Operations" to the Owner.

END OF SECTION - 16721

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